PRECISE ENVIRONMENTAL
Consulting Environmental Scientists

CONCEPT ONSITE SEWAGE MANAGEMENT DESIGN REPORT

Nightcap Village

Mount Burrell (Kunghur), New South Wales

NCV Enterprises Pty Ltd

November 2020

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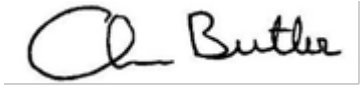

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1 INTRODUCTION

Precise Environmental (PE) was commissioned by NCV Enterprises Pty Ltd to prepare a concept onsite sewage management design report (OSMDR) for the proposed Nightcap Village precinct at Mount Burrell, New South Wales. The location of the site is shown in Appendix A, Figure 1.

The Nightcap Village will consist of a maximum of 459 residential dwellings, to be situated along prominent ridgelines within the precinct as detailed in the concept residential layout provided in Appendix A, Figure 2. Detailed plans for each dwelling site are not currently available.

Wastewater management concepts are provided for single dwelling sites and for clusters of dwellings to be managed by a community scheme. The concepts have been developed with respect to the sensitivity of the surrounding environment and public health. The concepts have been developed on the basis that single dwelling sites will not have town water or electricity supply. The concept for clusters of dwellings will likely require conventional power supply from the grid or via a site generator.

The effluent irrigation concepts have been developed using conservative factors given that there is variability across the catchment for soil depth, texture and permeability, depth to bedrock, slope, and aspect. As the development is located in a potential future dam catchment, there is no strategy provided for the disposal of blackwater via a conventional septic tank and trench.

A detailed OSMDR can be prepared in consultation with the design team and TSC once a detailed development layout is prepared.

1.1 Background

The allotments which form the Nightcap Village precinct are provided in Table 1.

Table 1. Project details

Aspect	**Detail**		
Project Name:	Nightcap Village		
Site identification:	Allotment	Area (hectares)	Address
	Lot 4 DP737440	90.82	2924 Kyogle Road, Kunghur, NSW
	Lot 2 DP582300	71.71	2954 Kyogle Road, Kunghur, NSW
	Lot 31 DP755714	88.03	
	Lot 32 DP755714	125.45	
	Lot 22 DP755714	46.54	
	Lot 19 DP755714	48.56	
	Lot 8 DP755714	16.19	
	Lot 1 DP390311	162.27	
	Lot 2 DP611556*	122.40	
	Lot 1 DP611556*	5.06	
	Lot 33 DP755714	9.90	
	Lot 5 DP582299	134.1	
	Lot 3 DP755714	37.94	
	Lot 35 DP755714	30.76	
	Lot 121 DP134446*	158.17	

Aspect	Detail		
	Lot 11 DP1194471	126.60	
	Lot 1 DP1183098	3.02	
	Lot 34 DP755714*	47.04	2956 Kyogle Road, Kunghur, NSW
	Lot 20 DP755714	177.25	3222 Kyogle Road, Mount Burrell, NSW
	Lot 2 DP1148316*	81.51	
	Total site area	**≈1,583.32**	
Existing built structures:	There are existing residential dwellings on the allotments specified above as indicated by an asterisk (*). A red asterisk (*) denotes an allotment with a built structure that is potentially a residential dwelling, but confirmation is required. This OSSMDR does not address the sewage facilities associated with any of the existing dwellings.		
Proposed built structure/s:	This concept design has made allowance for three bedroom dwellings. Any change to the proposed number of dwellings will require design modifications to be addressed in a detailed design report.		
Potable water supply:	Potable water will be supplied via rainwater harvesting from dwelling rooves, and tanker imports (as required). Groundwater bores may be drilled on individual dwelling sites and for clustered community supply where feasible. Where groundwater bores are proposed, provision for higher sewage flow allowances will be required.		
Proposed sewage treatment:	<u>Single dwelling options</u> - All waste secondary[1] treatment using an aerated wastewater treatment system (AWTS) or similar (sand filters) or - Primary treatment of greywater, and - Composting toilets. <u>Clustered community option</u> - All waste secondary treatment using an AWTS or similar.		
Proposed effluent application methods:	<u>Single dwelling options</u> Sub-surface irrigation via pressure compensated drip irrigation or evapotranspiration absorption (ETA) bed for secondary quality effluent from a decentralised AWTS or Sub-surface irrigation via perforated irrigation lines for grey water, and composting box and associated liquid disposal trench for some systems. <u>Clustered community option</u> Sub-surface irrigation via pressure compensated drip irrigation for secondary quality effluent from a centralised AWTS		

[1] Table 3.1 of Environmental guidelines: use of effluent by irrigation (DEC 2004) considers that effluent with secondary treatment is generally considered to be low strength

1.2 Scope of work

The scope of the investigation included:

- Review of available aerial photographs and published information regarding site conditions, e.g. geology sheet, soil maps and notes, etc
- A site inspection and preliminary soil assessment to determine the general physical characteristics of the site and to determine the suitability of the site for the application of effluent
- The identification of any constraints to the on-site management of sewage
- The preparation of an on-site sewage management report.

The investigation was undertaken with reference to the following guidance documents:

- AS/NZS 1547:2012. *On-site domestic-wastewater management*
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ 2000)
- *Environmental guidelines: use of effluent by irrigation* (DEC 2004)
- *NSW Environment and Health Guidelines On-site Sewage Management for Single Households* (DLG et al. 1998).

1.3 Objectives

The objective of this report is to provide several sustainable wastewater management concepts for consideration by the project team and Tweed Shire Council (TSC) to enable the project to progress to the detailed design phase. The concepts provided by PE have been developed based on specific catchment conditions assessed by PE and the preliminary design/development information made available by Planit Consulting.

1.4 Limitations

The findings of this report are based on the objectives and scope of work outlined above. PE performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties or guarantees, express or implied, are made. Subject to the scope of work, PE's assessment is limited strictly to identifying typical environmental conditions associated with the subject property, and does not include evaluation of any other issues.

This report does not comment on any regulatory obligations based on the findings, for which a legal opinion should be sought. This report relates only to the objectives and scope of work stated, and does not relate to any other works undertaken for the client. The report and conclusions are based on the information obtained at the time of the assessment. Changes to the surface and subsurface conditions may occur subsequent to the investigation described herein, through natural processes or through the intentional or accidental addition of contaminants or ground works, and these conditions may change with space and time.

The results of this assessment are based upon site inspection and fieldwork conducted by PE personnel and information provided by the client. All conclusions regarding the property area are the professional opinions of the PE personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, PE assumes no responsibility or liability for errors in any data obtained from regulatory agencies,

information from sources outside of PE, or developments resulting from situations outside the scope of this project.

2 SITE IDENTIFICATION AND CHARACTERISTICS

2.1 Site details and zoning

A summary of the site details and zoning are provided in Table 2.

Table 2. Land use and surrounding land details.

Aspect	Detail
Local Government	Tweed Shire Council (TSC)
Parish	Kunghur
County	Rous
Current / proposed zoning (TSC)	TSC Local Environmental Plan (LEP) 2014 mapping shows the site as predominantly being within 'RU2 – Rural landscape' zone and a small section on the eastern side of the site being within 'RU5 – village' zone.
Existing land use and site structures	A mixture of remnant bushland and forestry plantation covers the majority of the site with access tracks and fire trails throughout. Cleared areas with rural use containing numerous houses and sheds are present predominantly through the centre, north and eastern areas.
Proposed land use	Residential
Surrounding land use	National Parks and Nature Reserves (Mebbin state forest) lies along the western site boundary and Rural landscape surrounds the remaining site boundaries. Environmental protection (habitat) is mapped ~ 900m north west of the boundary. Sensitive environmental mapping is provided in Appendix C

2.2 Site physical characteristics

A summary of the site physical characteristics are provided in Table 3.

Table 3. Land use and surrounding land details.

Aspect	Detail
Slope:	Various - ranging from gently to steeply inclined.
Slope configuration:	Various – ranging from linear planar, divergent to convergent.
Site aspect:	Various
Exposure:	Medium to high sun and wind exposure in the proposed dwelling areas.
Presence of shelter belts:	Various – low to high in the proposed dwelling areas.
Soil	A series of shallow hand auger holes were constructed in the proposed dwelling clusters to determine the variability in soil texture. A comprehensive evaluation will need to be completed at the detailed design phase. The identified characteristics were as follows: Predominant A horizons: Texture: Loams to light clay Colour: Brown to dark grey

Aspect	Detail
	Structure: Weak to moderate. Predominant B horizons: Texture: Medium to heavy clay Colour: Brown, red and orange brown Structure: Moderate to massive. Bedrock was identified in several areas of the site within 0.2 m of the surface.
Erosion potential:	Low to moderate

2.3 Closest sensitive environments

A summary of the closest sensitive environments are provided in Table 4. Environmental mapping is provided in Appendix B.

Table 4. Closest sensitive environment details.

Environmental feature	Approximate distance from site
Council land mapping (TSC 2019)	
National parks:	Along the entire western border lies Mebbin National Park, part of the world heritage listed Gondwana Rainforests of Australia.
Area of environmental significance:	880 m northeast – environmental protection (habitat). A regional fauna corridor crosses through the site connecting Mebbin National Park and Nightcap National Park.
2009 Vegetation mapping vegetation types within and surrounding site:	Native plantation, grey ironbark / white mahogany / grey gum open forest complex, substantially cleared of native vegetation, tallowwood open forest, flooded gum open forest, Sydney blue gum open forest.
Bushfire prone land:	The majority of the site and surrounding locale are mapped as vegetation category 1 bushfire prone land surrounding locale. Vegetation buffers and small sections of vegetation category 2 are also present within and surrounding the site.
Farmland protection project and significant farmland protection:	Applies to sections of the Tweed River running along the southern site boundary and adjacent to the southeast site boundary.
Native Title:	There are no active native titles across the site or within 1 km of the site boundary.

Environmental feature	Approximate distance from site
Council waterway information (TSC 2019)	
Area of environmental significance – state and local significant wetlands and aquatic systems:	The Tweed River abuts the east and south site boundaries is mapped as part of the Richmond River catchment which does not have water quality objectives (WQOs). As the site is directly upstream from the Tweed River catchment, the 'uncontrolled streams' WQOs could be adopted and include: aquatic ecosystems, visual amenity, primary and secondary contact recreation, livestock water supply, irrigation water supply, homestead water supply, drinking water at point of supply (disinfection only, clarification and disinfection, and groundwater) and aquatic foods (cooked).
Natural waterbody:	Byrrill Creek runs adjacent to the northern boundary with one of its tributaries, Kunghurloo Creek, entering the site across the northern boundary and continuing south and spreading throughout the site. Kunghur Creek lies 410 m east and is connected to the Tweed River. Numerous drainage lines are present throughout the property.
Dam:	4,400 m east – Clarrie hall dam
Drinking water catchment:	Mapped across entire site and surrounding locale, and expected to eventually report to Clarrie Hall Dam.
Future water storage facilities:	TSC maps a large portion of the site and area to the north as a future water storage facility, however a plan provided from Planit Consulting shows a future dam would not extend as far as the western site boundary (see Appendix A, Figure 2).
Groundwater vulnerability:	Groundwater vulnerability mapped across the site corresponds with the elevation. The western side of the site (higher elevation) is mapped as moderately low vulnerability, central and eastern areas are mapped as moderately vulnerable and a small section on the eastern side (towards Tweed River) is mapped as moderately high vulnerability.

2.4 Geology and hydrology

The hydrology and geology, including topography and hydrogeology, details for the site are provided in Table 5.

Table 5. Topography and hydrology details for the catchment.

Aspect	Detail
Elevation and topography	The site topography is highly variable, with contours ranging from 80 m to 220 m. Contour lines are included in Appendix A, Figure 2.
Direction of stormwater drainage	Due to the large site area and topography, stormwater pathways are numerous and variable. However, TSC mapping identifies the drainage routes of concern (see Appendix B), with potential receptors being the waterways identified in Table 4.
Onsite surface waters	Kunghurloo creek flows from Byrrill Creek north of the site and traverses across the site. Numerous dams are located within the site and are shown in the figures in Appendix A and mapping in Appendix C. Tweed River abuts the site though is understood to be outside the site boundary.

Aspect	Detail
Geology	The geological map of NSW maps the geology of the western locale of the site as Jurassic sedimentary rocks and the eastern locale of the site is mapped as Triassic-Jurassic sedimentary rocks.
Flood potential	The site is not mapped within a flood potential zone.
Registered groundwater bores in the locale	
Nearest groundwater bore information (NSW OoW map and bore reports provided in Appendix B)	North: stock and domestic bore (GW307369) ~ 375 m
	East: domestic and commercial bore (GW306754) ~ 750 m
	Eastern site boundary: domestic bore (GW306896)
	South: domestic bore (GW303196) ~ 2.1 km
Total depth	GW307369 – 42.0 m
	GW306754 – 120.0 m
	GW306896 – 36.0 m
	GW303196 – 24.0 m
Soil profiles (m)	GW307369 (0 – 12) Soil – red, with clay content (12 – 18) Shale (18 – 42) Basalt
	GW306754 (0 – 2) Topsoil (2 – 6) Sandstone (6 – 7) Basalt (7 – 15) Sandstone (15 – 43) Basalt – fractured (43 – 70) Basalt – solid (70 – 111) Basalt – fractured (111 – 113) Limestone (113 – 120) Basalt
	GW306896 – Not recorded on bore log.
	GW303196 (0 – 1) Topsoil (1 – 15) Clay (15 – 19) Basalt (19 – 20) Shale (20 – 24) Basalt
Upper water bearing zone (upper aquifer depth)	GW307369 – 27 to 30 m
	GW306754 – 105 to 111 m
	GW306896 – Not recorded on log
	GW303196 – 19 to 20 m
Standing water level (SWL)	GW307369 – 23.0 m
	GW306754 – 80.0 m
	GW306896 – Not recorded on bore log.
	GW303196 – 15.0 m

Aspect	Detail
Aquifer confined / unconfined	Where recorded, all upper water bearing zones are below/within bedrock, with the rise of the SWLs above the water bearing zones indicating pressure gradient differentials. These conditions indicate that the aquifer(s) are confined.

3 CONSIDERATIONS FOR SELECTING AN ONSITE SEWAGE SYSTEM

3.1 Characteristics and restrictive features to onsite sewage management

Table 4 of the Environment and Health Protection Guidelines for On-site Sewage Management for Single Households (DLG 1998) provides a broad rating system which details the limitations that various site features will have on an onsite sewage system and is specific to subsurface systems. PE has detailed this information in Table 6.

Table 6. Restrictions of various site features to the feasibility of onsite sewage systems

Feature / characteristic	Applicable system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
Flood potential	Irrigation areas	Rare, above 1 in 20 year flood contour	-	Frequent, below 1 in 20 year flood contour	Effluent transport offsite
	All treatment systems	Vents, openings, and electrical components above 1 in 100 year flood contour	-	Vents, opening and electrical components below 1 in 100 year flood contour	System failure and transport of effluent offsite
Sun / wind exposure	Irrigation areas	High sun and wind exposure	-	Low sun and wind exposure	Poor evapotranspiration
Slope (%)	Subsurface irrigation	0 - 10	10 - 20	> 20	Effluent runoff / erosion
Landform	All systems	Hill crests, convex side slopes and plains	Concave side slops and foot slopes	Drainage plains and incised channels	Groundwater pollution and resurfacing hazard
Run on/upslope seepage	Irrigation areas	None	Moderate	High – diversion not practical	Effluent transport offsite
Erosion potential	Irrigation areas	No erosion potential	-	Signs of erosion potential	Soil degradation, transport and system failure
Site drainage	Irrigation areas	No surface dampness	-	Visible surface dampness	Groundwater pollution and resurfacing hazard
Fill	All systems	No fill	Fill present	-	Subsidence and variable soil permeability
Land area	All systems	Sufficient area available	-	Insufficient area available	Health and pollution risks
Rocks and rock outcrops (% of land containing rocks > 200 mm)	Irrigation areas	< 10%	10 – 20%	> 20%	Limited system performance

Feature / characteristic	Applicable system	Minor limitation	Moderate limitation	Major limitation	Restrictive feature
Geology / regolith	All systems	-	-	Major geological discontinuities, fractured or porous regolith	Groundwater pollution hazard

3.2 Separation distances to sensitive environmental receptors and built structures

Separation distances are required between land application areas and built and natural structures for the protection of the environment and human health. The separation distances provided in Table 7 are derived from the *NSW Environment & Health Protection Guidelines* (DLG et al. 1998) and are considered minimum distances based on ideal site and soil conditions.

Table 7. Recommended separation distances for the protection of water quality.

System	Recommended separation distance
All land application systems	• 100 m to permanent surface waters (e.g. rivers, streams, lakes, water supply dam etc) • 250 m to domestic groundwater well • 40 m to other waters (e.g. farm dams, intermittent waterways and drainage channels, etc)
Subsurface irrigation	• 6 m if area up-gradient and 3 m if area down-gradient of swimming pools, property boundaries, driveways and buildings

Based on the topography of the site and number of creeks / watercourses in the vicinity, there is a possibility that some of the dwelling sites will be constrained. Appendix R of AS/NZS 1547:2012 (recommended setback distances for land application systems) provides a risk based guideline for adopting reduced separation distances compared with those in Table 7. PE has not provided a risk assessment at this time for any individual dwellings. If, any individual dwelling is unable to meet any of the above setback distances, then an individual risk assessment should be undertaken for the dwelling and Appendix R of AS/NZS 1547:2012 taken into consideration.

The irrigation areas will be positioned so that there is no risk of effluent contaminating Byrrill Creek and the Tweed River by complying with the separation distances in Table 7 as a minimum.

While the site is not located within a flood area, no irrigation area should be positioned in areas which could be subject to short term localised flooding.

In addition to the above, shallow depth bedrock (<0.5 m below ground level) is a constraint that can inhibit absorption of effluent that is not evapotranspired. If shallow bedrock is encountered within any of the proposed irrigation areas, then a suitable volume of top soil will need to be imported (or a combination of topsoil and native tree mulch). An ETA design cannot be utilised where there is shallow bedrock.

Where any of the above features are constraining to a proposed sewage treatment system at the site, increasing the proposed irrigation area and subsequently reducing the design irrigation rate would typically reduce any health or environmental risks to an acceptable level, and will be subject to a detailed sewage design report.

This preliminary design has included minimum buffer distances, system design and treatment options to confirm suitability of the land for irrigation. When considering the available land area, range of available options (both individual and the opportunity to provide a centralised treatment) there is no foreseeable impact that cannot be addressed through the detailed design phase and risk assessment.

3.3 Disinfection of sewage

Micro-organisms are ubiquitous in sewage, with a large number of them, if not managed or disinfected appropriately are capable of causing disease.

Any sewage treatment plant (STP) installed at the site must have adequate disinfection measures built in to mitigate any risks to human health as a result of effluent release to the environment. The most common disinfection method employed in STPs is chlorination. Chlorine is best utilised in systems in the final chamber prior to release, when sewage has been pre-treated via other chambers (e.g. a settlement chamber and aeration chamber) in STPs to reduce suspended solids loading, BOD loading and ammonia. Chlorine contact time should be at least 30 minutes. DLG *et al* (1998) specifies the following performances objectives to measure chlorination effectiveness:

- Free chlorine: 0.5 – 2 mg/L
- Faecal coliforms: < 30 cfu/100 mL.

DEC (2004) states the need to maintain chlorine residual in effluent systems, particularly where delivery to the irrigation area is via a series of long pipes. It is also stipulated that chlorine concentrations in excess of 1 mg/L may affect some sensitive horticultural crops, however other crops are generally capable of tolerating levels up to 5 mg/L. On this basis, it is imperative that the grass species within the irrigation area is tolerant to chlorine.

Based on the risks to human health, any contact (either direct or indirect) with untreated or treated effluent should be avoided. PE notes that there are other sewage disinfection methods available, and if any other disinfection measures are proposed as part of the detailed design phase of the project, that approval from TSC would need to be sought.

3.4 Operation and maintenance of sewage treatment systems

All sewage treatment systems within the proposed development must be operated and maintained in accordance with manufacturer specifications and the land owner and service contractor will be responsible for ensuring the onsite sewage management system is operated and maintained correctly. Notwithstanding any specific manufacturer requirements, all sewage treatment systems must be serviced on a quarterly basis as a minimum.

There must be no ponding or runoff of treated effluent from the designated irrigation area to minimise any impacts to nearby surface waters.

For dwelling sites which are intended for holiday use, treatment systems can be customised to accommodate for periods of intermediate use.

3.5 Regulation of onsite sewage management systems

Under Schedule 1 of the Protection of the Environment Operations (PoEO) Act (1997), sewage treatment is only classed as a scheduled activity if it has a processing capacity that exceeds 2,500 persons equivalent, as determined in accordance with guidelines established by an EPA notice, or 750 kL/day, whichever is greater.

Given the site will not be treating in excess of 750 kL/day, TSC will be responsible for regulating sewage treatment at the site.

Approval of any onsite sewage management system for this development will be subject to any generic and site specific approval conditions imposed by Tweed Shire Council once an assessment of a detailed onsite sewage management report has been submitted with reference to regulator made and endorsed guidelines.

3.6 Provision of the Tweed Local Environment Plan

TSC must be satisfied that Section 7.10 of the Local Environment Plan (LEP) 2014 can be complied with for the proposed development. The following sections of this report provide concept design options which are available and suitable for the development.

Subject to development consent being provided, the concept design/s adopted for either individual dwellings and/or clusters of dwellings will minimise any risks to the receiving environment while promoting the sustainable re-use of effluent to land via subsurface irrigation. Beyond this concept design report, site specific reports will be prepared and approved by TSC which can be conditioned as part of the development consent.

4 CONCEPT DESIGN A

Concept design A makes provision for the use a solar powered all waste secondary AWTS (or similar) and a designated irrigation area for each dwelling site. For the purpose of reducing setback distances from built and natural features, pressurised subsurface drip irrigation systems or ETA/ETS beds are considered to be sustainable options. A detailed design report must be prepared for each allotment to ensure the specific land designated for effluent irrigation is capable of accepting the nominated hydraulic loading.

4.1 Sewage treatment plant

All sewage generated from each dwelling to be treated to a minimum of secondary standard using a solar powered all waste treatment system (an example system is provided in Appendix C). The typical peak design capacity for these types of systems range from 1,500 to 2,000 L/day. A biological sand filter may be used as an alternative to the AWTS.

4.2 Hydraulic Loading

Predicted hydraulic loadings for a typical three bedroom dwelling are provided in Table 8 and have been adopted for this concept design.

Table 8. Predicted hydraulic loading for the proposed dwellings.

Built structure	Number of bedrooms	Maximum number of persons [A]	Typical sewage flow allowance for onsite roof water tank supply (L/person/day) [B]	Total daily hydraulic loading (L/day) [C]
Residential dwelling	3 bedrooms	4	120	**480**

Table notes:

A = maximum number of people who can occupy any dwelling under planning constraints for the site

B = specified in Appendix H in AS/NZS 1547:2012

C = b x c

4.3 Subsurface pressure compensated drip irrigation

Subsurface pressure compensated drip irrigation is more versatile than an ETA/ETS bed system because it can be installed on sloped land, however it typically takes up a larger footprint than an ETA/ETS bed system. Though the larger footprint reduces the occurrence of effluent ponding and runoff as the hydraulic loading is less than that of an ETA/ETS bed. An indicative layout for this irrigation system is provided in Appendix A, Figure 3.

The size of the IA required for a three bedroom dwelling is derived from AS/NZS 1547:2012. The most conservative DIR (2 mm/day) has been adopted for this concept based on the predominant subsoil texture identified by PE. The equation is as follows:

Ai = Qw ÷ DIR

Where

Ai = minimum IA required (m^2)

Qw = litres of sewage generated per day

DIR = design irrigation rate (2 mm/day applied)

Ai (3 bedroom) = (480 L/day) ÷ 2 mm/day

= 240 m²

In addition to the area requirements assessed above, TSC also endorses the Lismore City Council (LCC) land application sizing tool for onsite wastewater management systems, a model which predicts an irrigation area based on various input data. A comparison of the IAs using the above calculation and sizing tool is provided in Table 9.

Table 9. Land application areas sizing

Built structure	IA calculated using Australian Standard (m²)	IA calculated using the LCC land application sizing tool (m²)
3 bedrooms	240	505.7

The LCC model nominates an irrigation area at more than double that calculated using AS/NZS 1547:2012. The LCC model provides an evaluation of both hydraulic loading and nutrient impacts and is typically more conservative that the calculation method in AS/NZS 1547:2012. However, for the purpose of this preliminary concept design, the IA size calculated using AS/NZS 1547:2012 has been adopted. The use of the more conservative IA should be considered in consultation with TSC for the future detailed design phase.

The LCC output is provided in Appendix D.

4.4 ETA/ETS bed

Effluent irrigated to an ETA/ETS bed will typically occupy a smaller footprint than a subsurface drip irrigation area. An ETA/ETS bed system is typically better suited to level to gently inclined land to ensure the bed remains level and to avoid effluent run off. The total length of the bed has been determined using a conservative DIR derived from AS/NZS 1547:2012 (based on the predominant subsoil texture identified by PE) as follows:

L = Q ÷ (DLR x W)

Where

L = length of the bed in m

Q = design flow in L / day

DLR = design loading rate in mm / day (5 mm/day applied for category 6 soils)

W = width of the bed in m

Predicted length of the bed system:

L (3 bedroom) = 480 L/day ÷ (5 x 4)

= 24 m

The configuration requires for an ETA/ETS bed will be two ETA/ETS beds 4 m (W) x 12 m (L). Alternatively four beds 2 m (W) x 12 m (L) could also be installed. The typical range of dimensions for an ETA/ETS system are provided in Table 10 and are derived from Table L2 of AS/NZS 1547:2012. An indicative cross section of an ETA/ETS bed is provided in Appendix A, Figure 4 and has been derived from AS/NZS 1547:2012.

Table 10. Typical dimensions for a conventional bed or trench.

	Typical dimensions (mm)	Maximum (mm)	Minimum (mm)
Conventional bed			
Width	1,000 – 4,000	4,000	1,000
Depth of aggregate	300 - 600	600	300
Depth of topsoil	100 - 150	150	100
Spacing between adjacent beds	-	N/A	1,000

The LCC land application sizing tool for onsite wastewater management systems has predicted an equivalent ETA/ETS trench configuration of five trenches 2 m (W) x 19.9 m (L), which is larger than the number of trenches required compared with the calculation derived from AS/NZS 1547:2012. The LCC model output is provided in Appendix D.

4.5 Design summary and considerations

The dwelling sites will need to consider the constraints in Table 6 (Section 3) and the setback distances in Table 7 (Section 3) to ensure that sewage generated as part of the residential precinct can be irrigated in a sustainable manner to minimise risk to human health and the environment. Table 11 provides indicative areas that should be made available for the purposes of irrigating effluent only, accounting for setback distances to built structures only so that their locations and size can be considered for the purposes of preparing a detailed dwelling design.

Table 11. Indicative irrigation areas.

Dwelling size	IA minimum footprint (subsurface drip irrigation) (m^2)	IA footprint (including 3 – 6 m setback distance) (m^2)	IA minimum footprint (ETA/ETS bed irrigation) (m^2)	IA footprint (including 3 – 6 m setback distance) (m^2)
3 bedrooms	240 (assuming 12 x 20 m IA)	468 – 768	60	210 – 378

Note: Consultation is required with TSC regarding use of the LCC land application sizing tool which may increase the minimum irrigation area sizes specified above.

The above IA footprint with setback distances included are indicative only and will ultimately depend on the final dimensions and configuration of the IA. The above table does not include setback distances to nearby sensitive environmental receptors (which may further constrain areas for irrigation), however the IA footprints listed above should provide a guide when determining the configuration and sizing of the new residential allotments. Other planning considerations such as bushfire and regulated vegetation areas should also be considered and are not included as part of this concept design report.

5 CONCEPT DESIGN B

Concept design B makes provision for the use of composting toilet and a designated greywater treatment system for each dwelling site (i.e. water from laundries, sinks, hand basins and showers). This concept makes provision for the reuse of greywater via an ETA/ETS bed and/or subsurface irrigation via perforated pipe. Table H2 of AS/NZS 1547:2012 specifies a daily sewage flow allowance of 90 L/person/day for sewage (i.e. greywater) generated from handbasins, showers, baths, laundries and kitchens. This flow has been adopted for the purposes of sizing and irrigating greywater within each allotment.

A detailed design report must be prepared to ensure the specific land designated for effluent irrigation is capable of accepting the nominated hydraulic loading.

5.1 Greywater treatment systems

Table J2 of AS/NZS 1547:2012 specifies a minimum 1,800 L capacity for any domestic greywater system. Greywater is not permitted to bypass a treatment system. Greywater treatment systems must be certified by NSW Health. The greywater treatment system may direct effluent to the designated irrigation area via gravity. Solar power (or other electrical source) will be required for a pump system.

5.2 Hydraulic loading

Sewage generation allowances and greywater irrigation area sizing derived from AS/NZS 1547:2012 are provided in Table 12.

Table 12. Predicted hydraulic loading for the proposed site structures.

Built structures	Number of bedrooms	Maximum number of persons [A]	Typical greywater flow allowance for onsite roof water tank supply (L/person/day) [B]	Total daily hydraulic loading (L/day) [C]
Proposed dwellings	3 bedrooms	4	90	**360**

Table notes:

A = maximum number of people who can occupy any dwelling under planning constraints for the site

B = specified in Appendix H in AS/NZS 1547:2012

C = b x c

5.3 Subsurface drip irrigation using perforated pipe dripline

The size of the IA required for a 3 bedroom dwelling is derived from AS/NZS 1547:2012. The most conservative DIR (2 mm/day) has been adopted for this concept based on the predominant subsoil texture identified by PE. An indication of the layout of this greywater treatment system is provided in Appendix A, Figure 5. The equation is as follows:

Ai = Qw ÷ DIR

Where

Ai = minimum IA required (m^2)

Qw = litres of sewage generated per day

DIR = design irrigation rate (2 mm/day applied)

Ai (3 bedroom) = (360 L/day) ÷ 2 mm/day

= 180 m^2

A comparison of the IAs using the above calculation and the LCC land application sizing tool is provided in Table 13.

Table 13. Land application areas sizing

Built structures	IA calculated using Australian Standard (m^2)	IA calculated using the LCC land application sizing tool (m^2)
3 bedrooms	180	379.2

The LCC model nominates an irrigation area at more than double that calculated using AS/NZS 1547:2012. However, for the purpose of this preliminary concept design, the IA size calculated using AS/NZS 1547:2012 has been adopted. The use of the more conservative IA should be considered in consultation with TSC for the future detailed design phase.

The LCC output is provided in Appendix D.

5.4 ETA/ETS bed

The total length of a bed under this concept design has been determined using the DIR derived from AS/NZS 1547:2012 (based on the predominant subsoil texture identified by PE).

The equation is as follows:

L = Q ÷ (DLR x W)

Where

L = length of the bed in m

Q = design flow in L / day

DLR = design loading rate in mm / day (5 mm/day applied for category 6 soils)

W = width of the bed in m

Predicted length of the bed system:

L (3 bedroom) = 360 L/day ÷ (5 x 4)

= 18 m

If an ETA/ETS bed design is utilised for greywater, the minimum bed dimensions under this concept design are 4 m (W) x 18 m (L). An alternative ETA/ETS configuration would be two beds 2 m (W) x 18 m (L).

The LCC land application sizing tool for onsite wastewater management systems has predicted an equivalent ETA/ETS trench configuration of five trenches 2 m (W) x 19.9 m (L), which is greater than double the number of trenches required compared with the calculation derived from AS/NZS 1547:2012. It is noted the model has predicted the same ETA bed configuration as concept design A and appears to be based on nitrogen loading to the irrigation area.

The LCC model output is provided in Appendix D.

The typical range of dimensions for an ETA/ETS bed system are provided in Table 10 and are derived from Table L2 of AS/NZS 1547:2012.

5.5 Composting toilets

Composting toilets to be utilised under this concept design would reduce sewage demand and the irrigation area required for each dwelling. Composting toilets will capture urine and faecal materials only and have no additional water producing capabilities. Installation of waterless composting toilets under this design shall be conducted in accordance with AS/NZS 1546.2:2008 On-site domestic wastewater treatment units – Waterless composting toilets. The location of any waterless composting toilets should consider distances to nearby sensitive receptors and be installed to minimise any nuisance odour. An example of composting toilets which could be utilised are provided in Appendix E.

Appendix 5 of NSW Environment and Health Guidelines On-site Sewage Management for Single Households provides an indication of the conditions of approval which Council may issue at their discretion for the installation of composting toilets and are as follows:

1. The humus closet must be installed and operated in accordance with manufacturer instructions and any conditions imposed by an approval.
2. Council may impose limits on the number of residents in the premises where the humus closet is installed.
3. If the installation of the humus closet is to be installed internally within the dwelling, a separate closet or room must have an external wall; access must be through a door in the external wall or through an internal wall that opens directly into a passageway that opens directly to the outside. Access may not be through a habitable room, food storage or food preparation room.
4. If the installation is to be external to the dwelling, the humus closet must be installed within a building in accordance with the constructional requirements provided in the Local Government Act 1993.
5. A permanent notice with basic instructions must be affixed to the unit in a prominent position. The permanent notice must include provision for recording the date of last deposit into each chamber and the last time humus material was removed.
6. The fan fitted to the air vent must be installed in such a way that it operates continuously. Easy access must be provided for repairs or replacement of the fan.
7. Council may impose a minimum composting period based on the type of humus closet installed.
8. Composted humus may be removed from the humus closet by the occupier or an authorised service agent only after the minimum composting period as stated. The owner should ensure a working environment which meets occupational health and safety requirements.
9. Humus material that has been only partly composted may be removed from the humus closet only with the written consent of the local council.
10. Composted humus may be removed only through the access door (where provided) or from the humus storage tray.
11. Composted humus may be managed only within the boundaries of the premises and by the occupier of the premises.

12. Composted humus may not be removed from the premises unless the written approval of the local council has been obtained.
13. The composted humus from the humus closet may not be disposed of directly in an area used for the production of root crops for human consumption
14. The composted humus may be buried under clean friable soil in a level area not subject to erosion at a depth of 75 mm below finished ground level for a minimum period of three months
15. The composted humus may be used only in an area used for the production of root crops for human consumption where:
    a. The composted humus is removed from the humus closet as specified in 10, is placed into a separate lidded compost bin providing aeration, and a period of three months elapses without further addition to the removal from the bin, or
    b. The humus so managed under 14 has seasoned for a period of not less than three months and may be recovered and used.
16. All sullage must be managed in a way that does not create any nuisance or pollute any watercourse
17. The site must be been inspected by Council and it must be demonstrated to Council that the humus and sullage can be completely managed without nuisance or likely danger to health.

Notwithstanding complying with any conditions of approval Council may issue, composting toilets (particularly when installed externally) also have a footprint which needs to be considered in addition to the irrigation area required for greywater production in each dwelling.

5.6 Design summary and considerations

This concept design may provide a more energy efficient solution compared to an all waste secondary effluent treatment system, particularly where available irrigation area within an allotment is limiting or constrained by physical features.

This design must also consider potential TSC imposed conditions of approval for the construction, installation, service and maintenance of any composting toilet installed. The greywater irrigation area will require a minimum of 180 m^2 of subsurface irrigation using perforated pipe or an ETA/ETS bed measuring for example 4 m (W) x 18 m (L). There is also a small subsurface trench required for liquid that drains from some composting toilets as per the manufacture's recommendations (some systems are 100 % evaporative).

Table 14 provides indicative areas that should be made available for the purposes of irrigating greywater only, accounting for setback distances to built structures only so that their locations and size can be considered for the purpose of allocating area.

Table 14. Indicative irrigation areas.

Dwelling size	IA minimum footprint (subsurface drip irrigation) (m^2)	IA footprint (including 3 – 6 m setback distance) (m^2)	IA minimum footprint ETA/ETS bed irrigation) (m^2)	IA footprint (including 3 – 6 m setback distance) (m^2)
3 bedrooms	180 (assuming 10 x 18 m IA)	384 – 660	45	172.5 – 380

Note: Consultation is required with TSC regarding use of the LCC land application sizing tool which may increase the minimum irrigation area sizes specified.

The above IA footprint with setback distances included are indicative only and will ultimately depend on the final dimensions and configuration of the IA. The above table does not include setback distances to nearby sensitive environmental receptors (which may further constrain areas for irrigation), however the IA footprints listed above should provide a guide when determining the configuration and sizing of the new residential sites. Other planning considerations such as bushfire and regulated vegetation areas should also be considered and are not included as part of this concept design report. The IA footprint for a composting toilet will vary depending on manufacturer specifications. The footprint is usually very small for waterless toilets.

6 CONCEPT DESIGN C

Concept design C makes provision for the use of an all waste treatment system for a cluster of dwellings (Potential dwelling clusters are provided in Appendix A, Figure 6). For the purposes of this concept design, the cluster sizes (number of dwellings) range from 3 – 37. For the purpose of reducing setback distances from built and natural features, pressurised subsurface drip irrigation systems are considered to be the most sustainable option. An example flow process diagram for this concept design for each cluster of dwellings is provided in Appendix A, Figure 7A – 7D.

A detailed design report must be prepared to ensure the specific land designated for effluent irrigation is capable of accepting the nominated hydraulic loading.

6.1 Sewage treatment plant

All grey and blackwater generated from dwelling clusters will be gravity fed (or pumped) to a centralised treatment system capable of treating wastewater to a minimum of secondary quality. Each STP must be suitably sized to cater for sewage flows as per Table 15.

6.2 Irrigation method and irrigation area sizing

If concept design C is adopted for this development, then subsurface pressure compensated drip irrigation would be the preferred method of irrigation as scaling an ETA/ETS system would not be possible given the variable topography of the land. Sizing of appropriate IAs for each cluster of dwellings was derived from AS/NZS 1547:2012. Sewage generation allowances from Table 8 have been used in the equation and a conservative DIR of 2 mm/day applied based on the predominant subsoil texture identified by PE. IA sizes for each cluster is provided in Table 15.

Table 15. Land application areas sizing

Cluster	Number of dwellings (subject to change)	Total flow (L/day)	Minimum irrigation area required (m^2)[c]
A	24	11,520	5,760
B	9	4,320	2,160
C	4	1,920	960
D	7	3,360	1,680
E	4	1,920	960
F	37	17,760	8,880
G	3	1,440	720
H	12	5,760	2,880
I	9	4,320	2,160
J	18	8,640	4,320
K	9	4,320	2,160
L	21	10,080	5,040
M	6	2,880	1,440
N	32	15,360	7,680

Cluster	Number of dwellings (subject to change)	Total flow (L/day)	Minimum irrigation area required (m^2)[c]
O	15	7,200	3,600
P	18	8,640	4,320
Q	12	5,760	2,880
R	13	6,240	3,120
S	8	3,840	1,920
T	13	6,240	3,120
U	19	9,120	4,560

It is noted that the LCC land application sizing tool may more than double the irrigations areas specified above which were determined using AS/NZS 1547:2012. Furthermore, the number of dwelling per cluster may also change.

6.3 Design summary and considerations

This concept design provides an option for a centralised sewage treatment system for clusters of dwellings. Overall, there would be fewer but larger irrigation areas within the development area. It is anticipated that the total cost of this option would be less than for Concept A as there is economies of scale for the infrastructure.

This concept may be restrictive if:

- There is insufficient irrigation area available within a precinct (unlikely)
- There are other planning constraints (e.g. vegetation/bushfire) which prohibit / prevent irrigation within certain areas or risk of damage to infrastructure
- The cost of providing all sewage infrastructure (e.g. power supply via the grid or generator, pipelines, pump stations etc) is prohibitive.

Notwithstanding this, the STPs and irrigation areas would need to be maintained by an entity such as a body corporate or other management body for the entire site or cluster of dwellings, as effluent would likely be directed to a suitable community area. It is noted that the requirement for a reliable power supply for pump stations and the centralised sewage treatment system does not mean that individual dwellings need to have grid power supply (this is optional).

This design would be beneficial for any clusters of houses located within 100 m of the future dam, the flexibility of the design would allow for a suitable area to be selected outside of the 100 m setback of the dam, notwithstanding any planning constraints.

7 CONCLUSION

The proposed Nightcap Village is in the preliminary design phase and this report has been prepared to provide the project team and TSC with several preliminary treatment and irrigation/disposal options for grey and blackwater for the proposed 300 plus dwelling sites. All of the options are considered to be sustainable and capable of mitigating risks to human health and the environment if regularly serviced and maintained.

Once a detailed development layout is prepared, a site specific wastewater management design can be prepared for each dwelling site and/or precinct (i.e. in the instance that a centralised system is installed for one or more cluster of dwellings), providing confirmation that setback distances can be achieved between irrigation areas and built and natural structures for all sites. It will be a requirement to confirm the maximum number of bedrooms for each dwelling to ensure there is no overloading of effluent within the designated irrigation areas and to appropriately size the sewage treatment plants on each dwelling site and/or precinct.

A preliminary assessment of irrigation size for subsurface drip irrigation systems and ETA/ETS beds using the LCC land application sizing tool doubles the size of irrigation areas calculated using AS1547:2012 which will need to be considered for the detailed design phase in consultation with TSC.

It may be a requirement of TSC in the detailed design phase to assess the sewage treatment and irrigation systems associated with each of the existing residential dwellings to ensure that any old non-compliant systems are upgraded. Upgrades are expected to be required for some of the existing dwellings based on preliminary observations made by PE.

Whilst the Nightcap village is situated in a future dam catchment and there are topographical features that are restrictive in some areas of the site (i.e. areas containing heavy clay soils, shallow bedrock, moderate to steeply inclined slopes, ephemeral gullies and creeks), there are several sustainable wastewater treatment and irrigation strategies available for each of the proposed dwelling sites and precincts. The power supply will influence the range of options available to each dwelling site/cluster of dwellings. Due to sensitive environmental setting of the site and centrally located potential dam catchment, there has been no option provided for primary treatment and land disposal of blackwater.

8 REFERENCES

ANZECC/ARMCANZ. 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council, and Agriculture and Resource Management Council of Australia and New Zealand.

AS/NZS 1547:2012. On-site domestic-wastewater management. Standards Australia International Ltd and Standards New Zealand.

DEC. 2004. Environmental guidelines: use of effluent by irrigation. Department of Environment and Conservation NSW, December 2004.

DLG, NSW EPA, NSW Health, LWC, LWC, DUAP. 1998. Environment & Health Protection Guidelines On-site Sewage Management for Single Households. Department of Local Government, NSW EPA, NSW Health, Land and Water Conservation, Department of Urban Affairs and Planning, January 1998.

APPENDIX A – FIGURES

Figure 1

WATERWAYS ANALYSIS

POTENTIAL FUTURE DAM
SHOWN AS 140M AHD

LEGEND

- POTENTIAL FUTURE DAM WITHIN SCOPE
  WITH 30M OFFSET FROM WATER
- POTENTIAL FUTURE DAM OUTSIDE SCOPE
  WITH 30M OFFSET FROM WATER
- CREEKS / RIVERS

PLANIT CONSULTING

NIGHTCAP ECO VILLAGE
CONSTRAINTS ANALYSIS

Date: NOVEMBER, 2019 **Drawn:** JW
Scale: 1:10000 @ A1 **Checked:** DM
Rev: 02

0 200 400 600
SCALE - 1:10000 @ A1 , 1:20000 @ A3

Figure 2

ECOLOGICAL CONSTRAINTS / OPPORTUNITIES ANALYIS

LEGEND

- MAPPED HIGH QUALITY ECOLOGICAL FOOTPRINT
- IDENTIFIED ECOLOGICAL LINKAGES
- SITE LINKAGES TO WIDER ECOLOGICAL VALUE

PLANIT CONSULTING

NIGHTCAP ECO VILLAGE
CONSTRAINTS ANALYSIS

Date: NOVEMBER, 2019 **Drawn:** JW
Scale: 1:10000 @ A1 **Checked:** DM
Rev: 02

0 200 400 600
SCALE - 1:10000 @ A1 , 1:20000 @ A3

EFFLUENT IRRIGATION LEGEND

- AV — AIR VALVE (if required)
- FV — LINE FLUSHING VALVE
- COLLECTION MAIN
- DISTRIBUTION MAIN
- DISTRIBUTION SUBMAIN
- DRIP IRRIGATION LINE

MINIMUM SETBACK DISTANCES

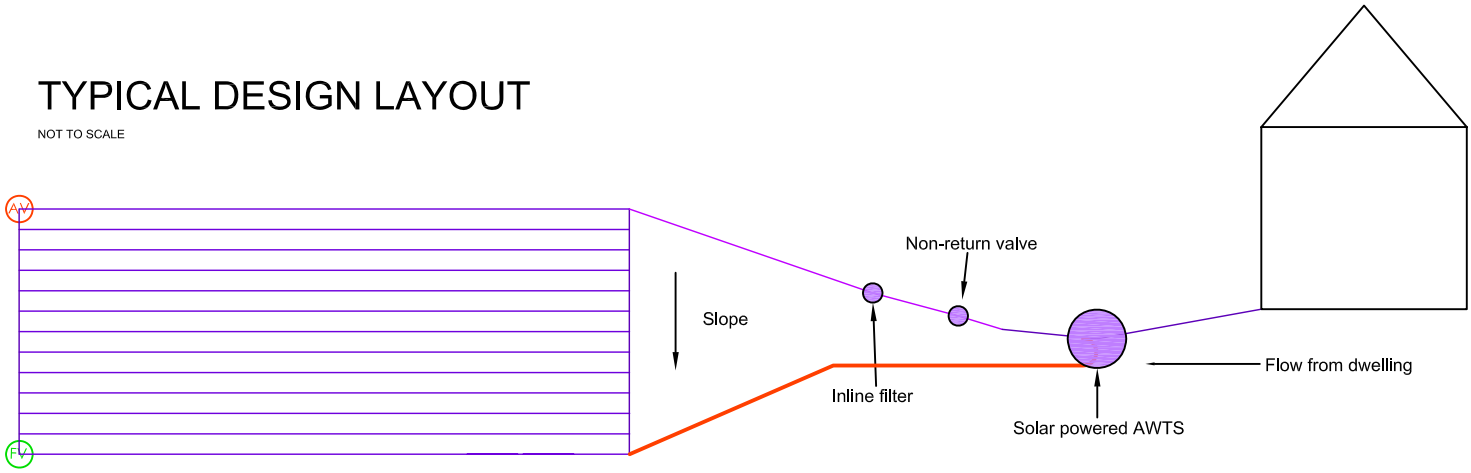
- PERMANENT SURFACE WATERS: 100 m
- DOMESTIC GROUNDWATER BORE: 250 m
- OTHER WATERS (e.g. DAMS, STORMWATER GULLIES, DRAINAGE CHANNELS): 40 m
- SWIMMING POOLS, PROPERTY BOUNDARIES, DRIVEWAYS AND ANY BUILT STRUCTURES: 3 m if area is downgradient, 6 m if area is upgradient

INSTALLATION NOTES FOR 3 BEDROOM RESIDENTIAL DWELLING

- Sub-surface drip irrigation lines to be installed at 1.0 m spacings across slope gradient.
- Total wetted irrigation area to be 240 m².
- Air valves to be installed at high points of irrigation areas.
- Manual field line flushing valves to be installed at low points of irrigation areas.
- Removeable or permanent flush return pipeline to wastewater treatment systems to be used when flushing lines.
- All plumbing and drainage work is to comply with AS/NZS 3500 and AS/NZS 1547.2012.
- Sub-surface irrigation lines may be positioned around existing vegetation and must maintain minimum spacing distances.
- Application areas must remain turfed or be planted out with appropriate vegetation and warning signs displayed prior to commissioning the wastewater treatment system.
- A non-return valve should be fitted to the pump discharge line as close as practical to the outlet of the pump.
- An inline strainer (150-200 µm) is to be fitted to the distribution line prior to the land application area.
- All buried pipes shall be indicated using underground marking tape to AS/NZS 2648.1 or be indicated by signage stating the words: Sewage effluent pipework installed below. DO NOT DIG.

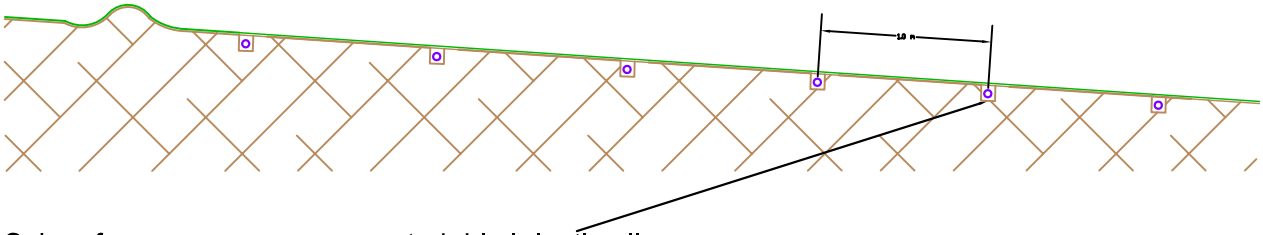
TYPICAL DESIGN LAYOUT

NOT TO SCALE



TYPICAL CROSS SECTION

NOT TO SCALE



Subsurface pressure compensated drip irrigation lines installed <150 mm below surface

Client: NCV ENTERPRISES PTY LTD	Project number: PE2706.18	Site Address: MOUNT BURRELL (KUNGHUR), NEW SOUTH WALES		
Project: ONSITE SEWAGE MANAGEMENT REPORT	Scale: NOT TO SCALE	Real property description: VARIOUS - SEE REPORT		
	Drawn by: SEAN GARDINER	Drawing number: FIGURE 3	Drawning version: A	Date drawn: 18.03.19
PRECISE ENVIRONMENTAL Consulting Environmental Scientists	Reviewed by: CHRIS BUTLER	Drawing title: CONCEPT DESIGN A - SUBSURFACE DRIP IRRIGATION LAYOUT		

Unit 7 / 14 Fremantle Street, Burleigh Heads, Qld, 4220
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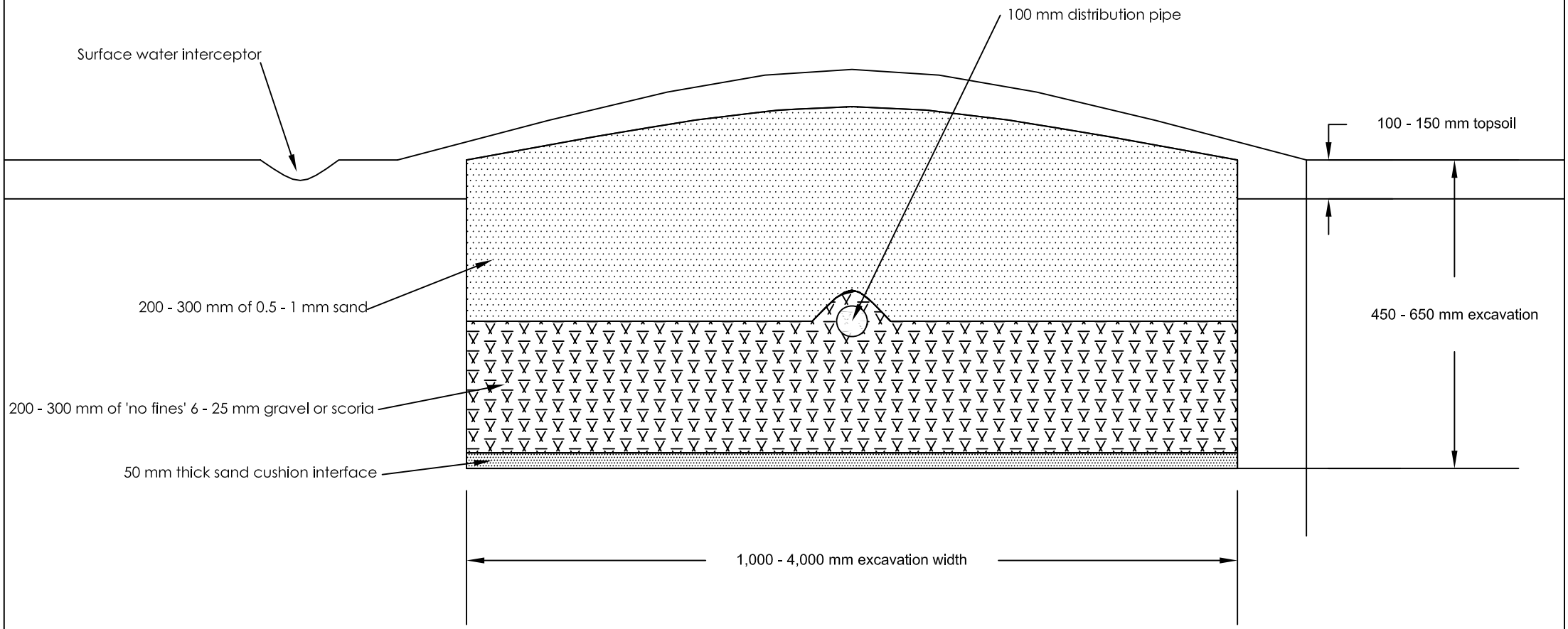
Ph: (07) 55937848 Fax: (07) 5593 7020
mail@preciseenvironmental.com.au
www.preciseenvironmental.com.au

TYPICAL DESIGN LAYOUT - ETA/ETS BEDS

ETA/ETS bed length
Concept Design A - 3 Bedrooms (4 residents): Two ETA/ETS beds 4 m (W) x 12 m (L)
Concept Design B - 3 Bedrooms (4 residents): One ETA/ETS bed 4 m (W) x 18 m (L)


100 mm distribution pipe
Surface water interceptor
100 - 150 mm topsoil
200 - 300 mm of 0.5 - 1 mm sand
450 - 650 mm excavation
200 - 300 mm of 'no fines' 6 - 25 mm gravel or scoria
50 mm thick sand cushion interface
1,000 - 4,000 mm excavation width

Client: NCV ENTERPRISES PTY LTD	Site location: MOUNT BURRELL (KUNGHUR), NEW SOUTH WALES		Real property description: VARIOUS - SEE REPORT		Drawing number: FIGURE 4	PRECISE ENVIRONMENTAL Consulting Environmental Scientists
					Drawing version: A	
Project: ONSITE SEWAGE MANAGEMENT REPORT	Project number: PE2706.18	Scale: NOT TO SCALE	Drawn by: SG	Reviewed by: CB	Drawing title: CONCEPT DESIGN - ETA/ETS BED CROSS SECTION	Unit 7 / 14 Fremantle Street, Burleigh Heads, Qld, 4220 PO Box 4424, Robina Town Centre, Qld 4230 Ph: (07) 5593 7848 Fax: (07) 5593 7020 mail@preciseenvironmental.com.au
			Date drawn: 18.03.2019	Approved: CB		

EFFLUENT IRRIGATION LEGEND

- COLLECTION MAIN
- DISTRIBUTION MAIN
- DISTRIBUTION SUBMAIN
- DRIP IRRIGATION LINE

MINIMUM SETBACK DISTANCES

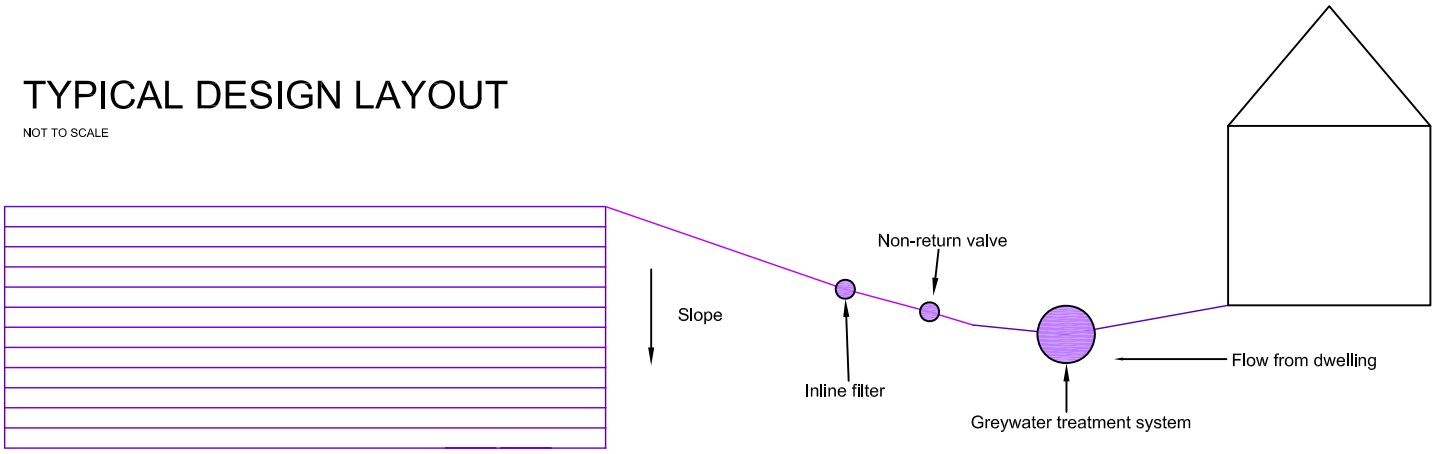
- PERMANENT SURFACE WATERS: 100 m
- DOMESTIC GROUNDWATER BORE: 250 m
- OTHER WATERS (e.g. DAMS, STORMWATER GULLIES, DRAINAGE CHANNELS): 40 m
- SWIMMING POOLS, PROPERTY BOUNDARIES, DRIVEWAYS AND ANY BUILT STRUCTURES: 3 m if area is downgradient, 6 m if area is upgradient

INSTALLATION NOTES FOR 3 BEDROOM RESIDENTIAL DWELLING

- Sub-surface perforated irrigation lines to be installed at 1.0 m spacings across slope gradient.
- Greywater treatment system capacity to be a minimum of 1,800 L
- Total wetted irrigation area to be 180 m².
- Air valves to be installed at high points of irrigation areas.
- Manual field line flushing valves to be installed at low points of irrigation areas.
- Removeable or permanent flush return pipeline to wastewater treatment systems to be used when flushing lines.
- All plumbing and drainage work is to comply with AS/NZS 3500 and AS/NZS 1547.2012.
- Sub-surface irrigation lines may be positioned around existing vegetation and must maintain minimum spacing distances.
- Application areas must remain turfed or be planted out with appropriate vegetation and warning signs displayed prior to commissioning the wastewater treatment system.
- A non-return valve should be fitted to the pump discharge line as close as practical to the outlet of the pump.
- An inline strainer (150-200 µm) is to be fitted to the distribution line prior to the land application area.
- All buried pipes shall be indicated using underground marking tape to AS/NZS 2648.1 or be indicated by signage stating the words: Sewage effluent pipework installed below. DO NOT DIG.

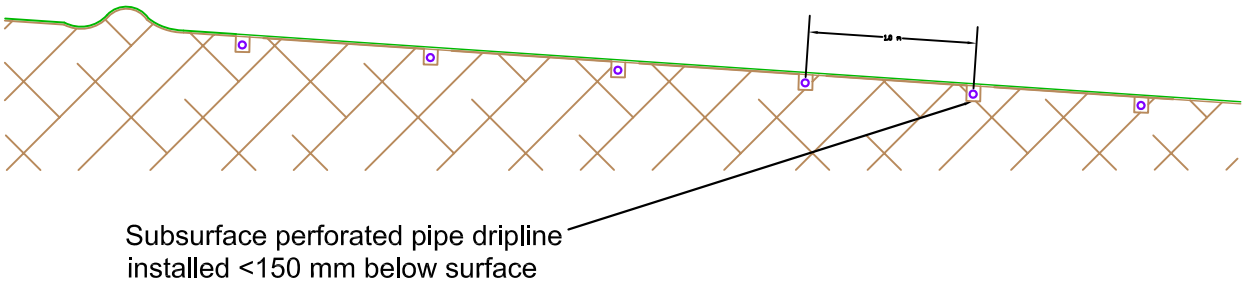
TYPICAL DESIGN LAYOUT

NOT TO SCALE



TYPICAL CROSS SECTION

NOT TO SCALE



Client: NCV ENTERPRISES PTY LTD	Project number: PE2706.18	Site Address: MOUNT BURRELL (KUNGHUR), NEW SOUTH WALES		
Project: ONSITE SEWAGE MANAGEMENT REPORT	Scale: NOT TO SCALE	Real property description: VARIOUS - SEE REPORT		
	Drawn by: SEAN GARDINER	Drawing number: FIGURE 5	Drawning version: A	Date drawn: 18.03.19
PRECISE ENVIRONMENTAL Consulting Environmental Scientists Unit 7 / 14 Fremantle Street, Burleigh Heads, Qld, 4220 PO Box 4424, Robina Town Centre, Qld, 4230 Ph: (07) 55937848 Fax: (07) 5593 7020 mail@preciseenvironmental.com.au www.preciseenvironmental.com.au	Reviewed by: CHRIS BUTLER	Drawing title: CONCEPT DESIGN B - GREYWATER TREATMENT SYSTEM		

LEGEND

- Site boundary
- Constrained land - future dam (a 100 m separation distance is applicable for disposal of effluent)
- Ecological constraint (Planit Consulting 2019)
- Developable area (Planit Consulting 2019)

All locations indicative only

Drawing sourced and modified from Planit Consulting Pty Ltd, Drawing No. A101

Dwelling cluster H
Dwelling cluster B
Dwelling cluster D
Dwelling cluster A
Dwelling cluster G
Dwelling cluster E
Dwelling cluster U
Dwelling cluster I
Dwelling cluster N
Dwelling cluster C
Dwelling cluster T
Dwelling cluster F
Dwelling cluster S
Dwelling cluster M
Dwelling cluster J
Dwelling cluster P
Dwelling cluster K
Dwelling cluster Q
Dwelling cluster O
Dwelling cluster R
Dwelling cluster L

0 m 375 m 750 m 1,500 m

Client: NCV ENTERPRISES PTY LTD	Site location: MOUNT BURRELL (KUNGHUR), NEW SOUTH WALES		Real property description: VARIOUS - SEE REPORT		Drawing number: FIGURE 6	PRECISE ENVIRONMENTAL Consulting Environmental Scientists
					Drawing version: B	
Project: ONSITE SEWAGE MANAGEMENT CONCEPT DESIGN	Project number: PE2706.18	Scale: AS SHOWN	Drawn by: SG	Reviewed by: CB	Drawing title: POTENTIAL DWELLING CLUSTERS (CONCEPT DESIGN B)	
			Date drawn: 13.05.2019	Approved: CB		

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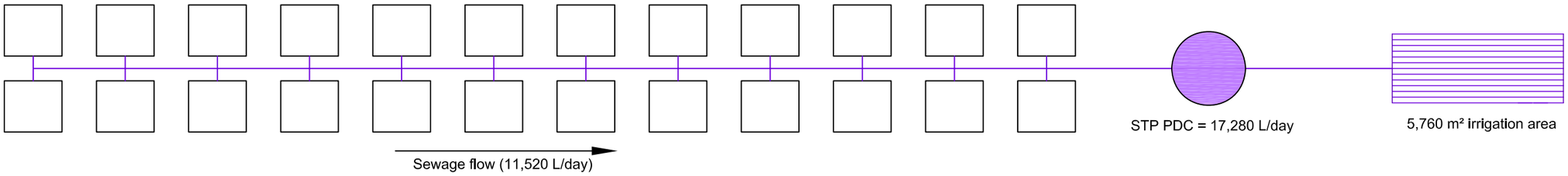
CLUSTER A



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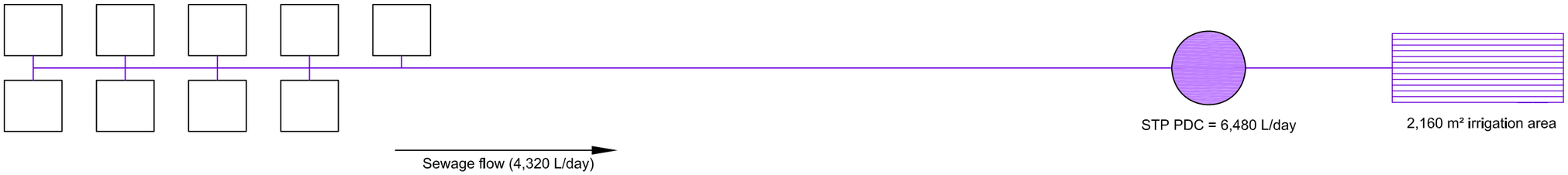

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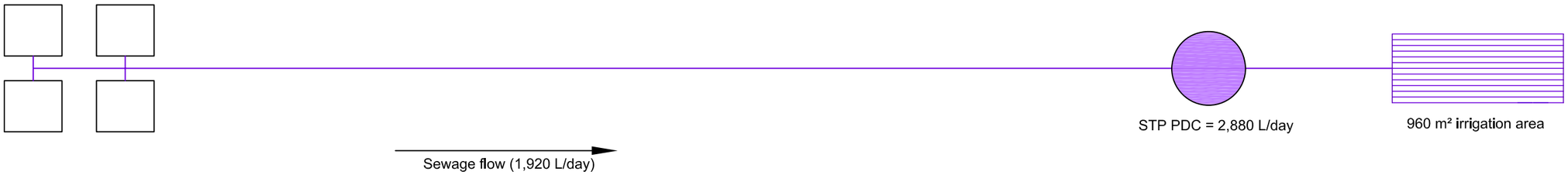

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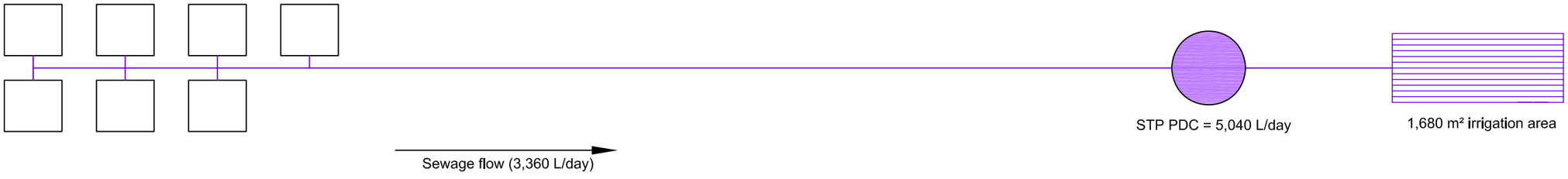

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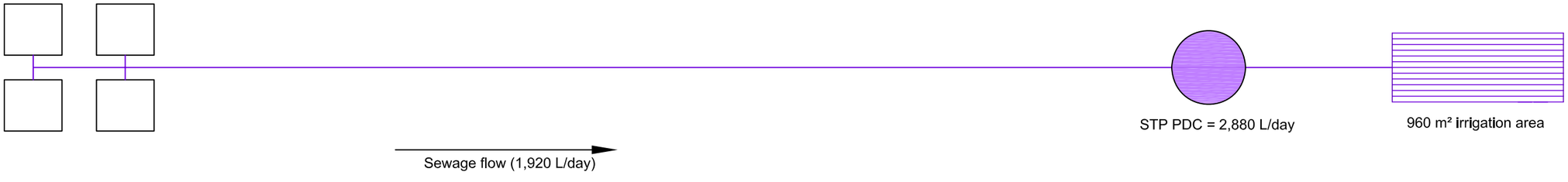

Figure notes:
1. STP PDC denotes sewage treatment plant peak design capacity
2. STP PDC has been calculated based on a nominal capacity of 150% of calculated sewage flows.

Client: NCV ENTERPRISES PTY LTD	Site location: MOUNT BURRELL (KUNGHUR), NEW SOUTH WALES		Real property description: VARIOUS - SEE REPORT		Drawing number: FIGURE 7A	PRECISE ENVIRONMENTAL Consulting Environmental Scientists
					Drawing version: A	
Project: ONSITE SEWAGE MANAGEMENT REPORT	Project number: PE2706.18	Scale: NOT TO SCALE	Drawn by: SG	Reviewed by: CB	Drawing title: FLOW PROCESS DIAGRAM 1	
			Date drawn: 14.3.2019	Approved: CB		

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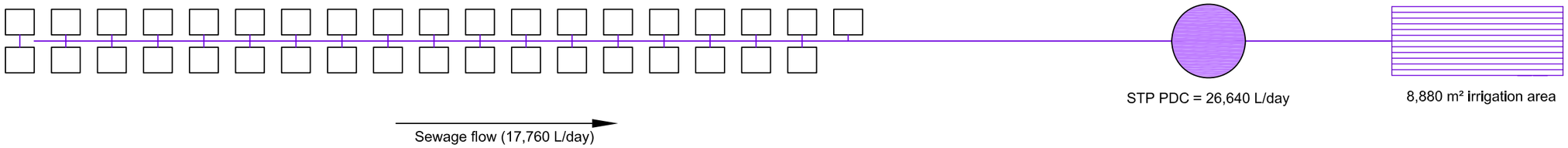
CLUSTER F



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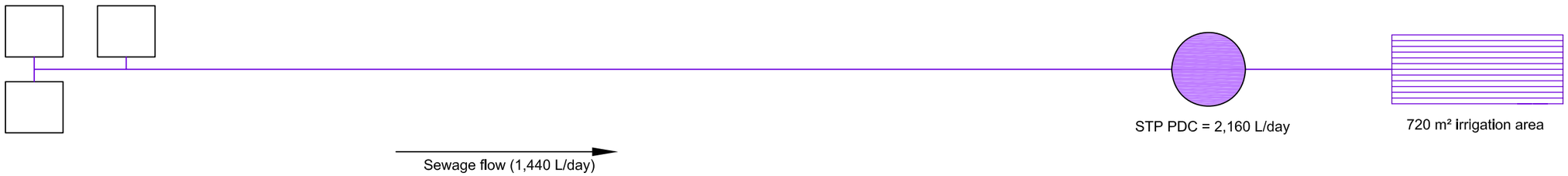

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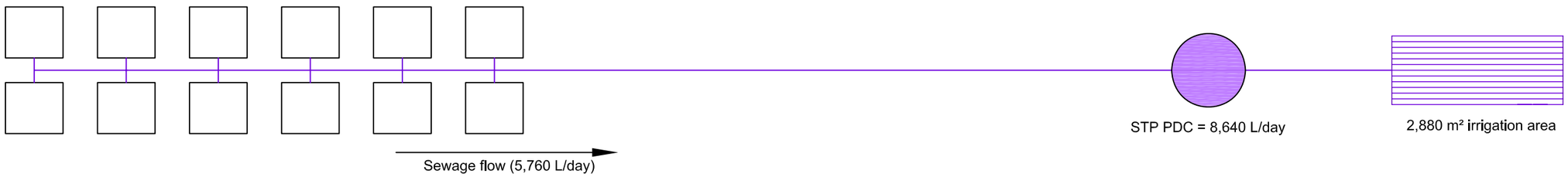

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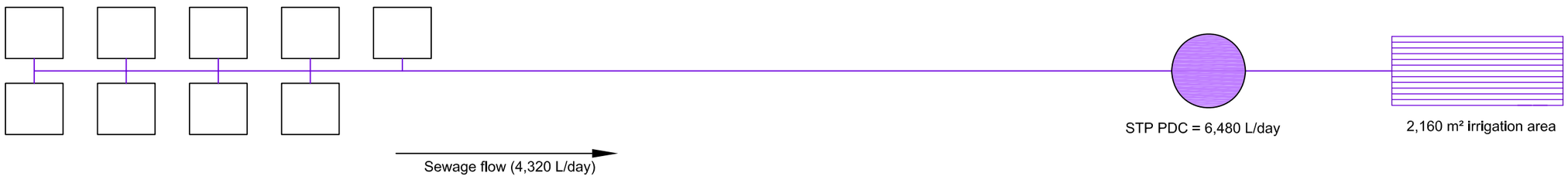

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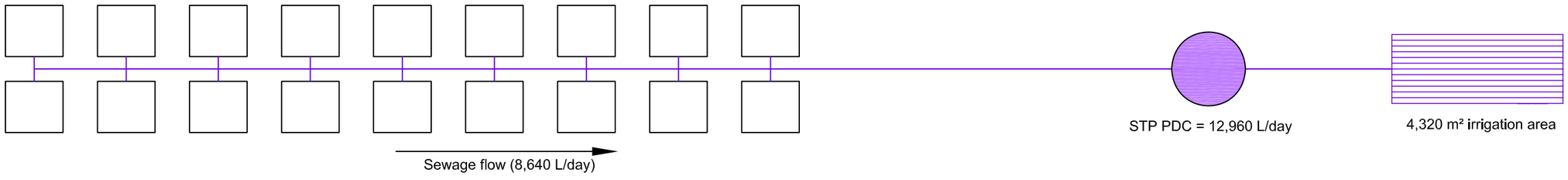

Figure notes:
1. STP PDC denotes sewage treatment plant peak design capacity
2. STP PDC has been calculated based on a nominal capacity of 150% of calculated sewage flows.

Client: NCV ENTERPRISES PTY LTD	Site location: MOUNT BURRELL (KUNGHUR), NEW SOUTH WALES		Real property description: VARIOUS - SEE REPORT		Drawing number: FIGURE 7B
					Drawing version: A
Project: ONSITE SEWAGE MANAGEMENT REPORT	Project number: PE2706.18	Scale: NOT TO SCALE	Drawn by: SG	Reviewed by: CB	Drawing title: FLOW PROCESS DIAGRAM 2
			Date drawn: 14.3.2019	Approved: CB	

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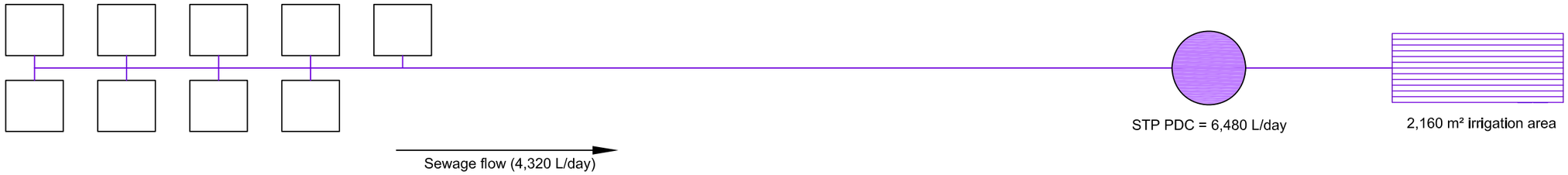
mail@preciseenvironmental.com.au

CLUSTER K



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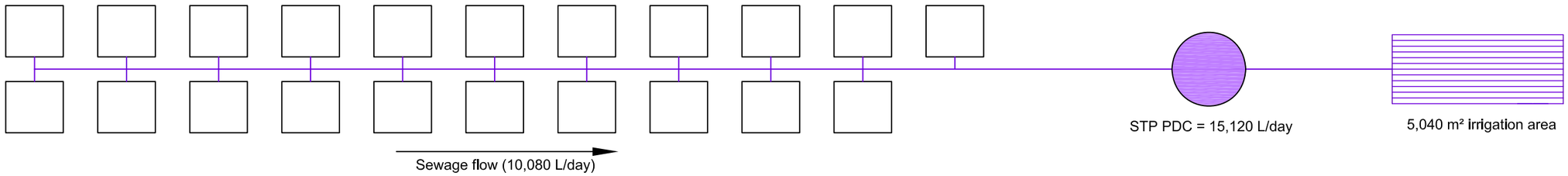

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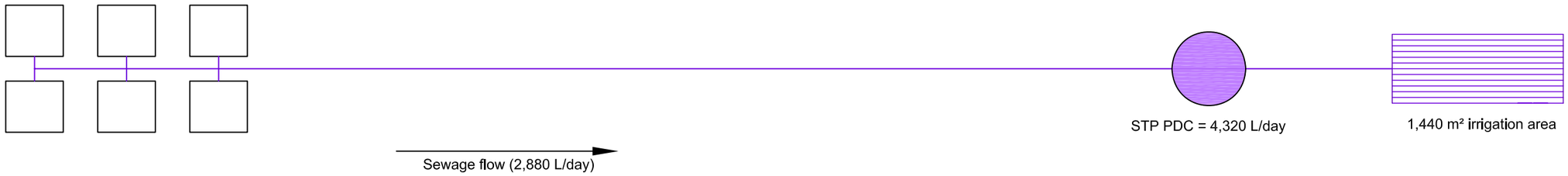

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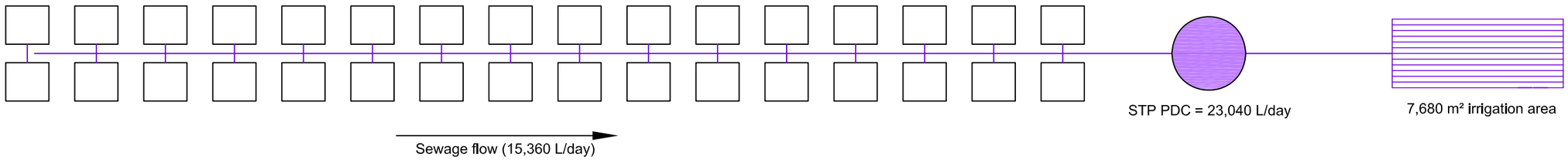

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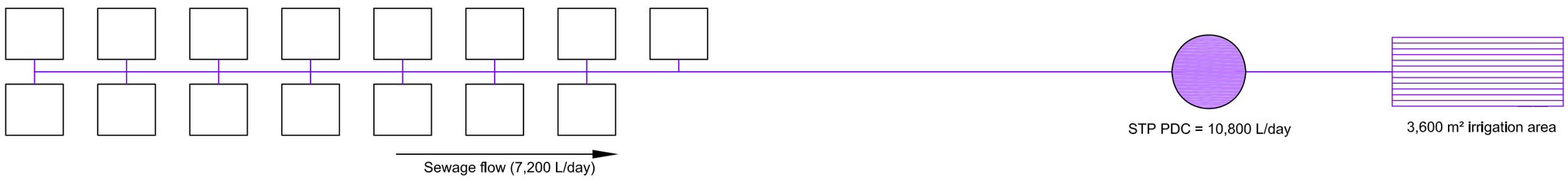

Figure notes:
1. STP PDC denotes sewage treatment plant peak design capacity
2. STP PDC has been calculated based on a nominal capacity of 150% of calculated sewage flows.

Client: NCV ENTERPRISES PTY LTD	Site location: MOUNT BURRELL (KUNGHUR), NEW SOUTH WALES		Real property description: VARIOUS - SEE REPORT		Drawing number: FIGURE 7C
					Drawing version: A
Project: ONSITE SEWAGE MANAGEMENT REPORT	Project number: PE2706.18	Scale: NOT TO SCALE	Drawn by: SG	Reviewed by: CB	Drawing title: FLOW PROCESS DIAGRAM 3
			Date drawn: 13.4.2019	Approved: CB	

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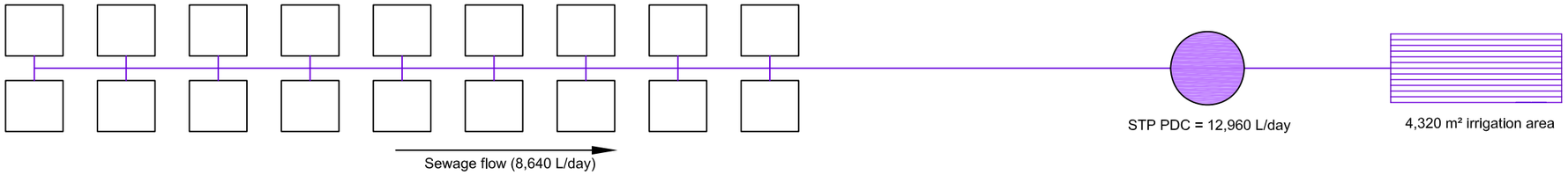
mail@preciseenvironmental.com.au

CLUSTER P



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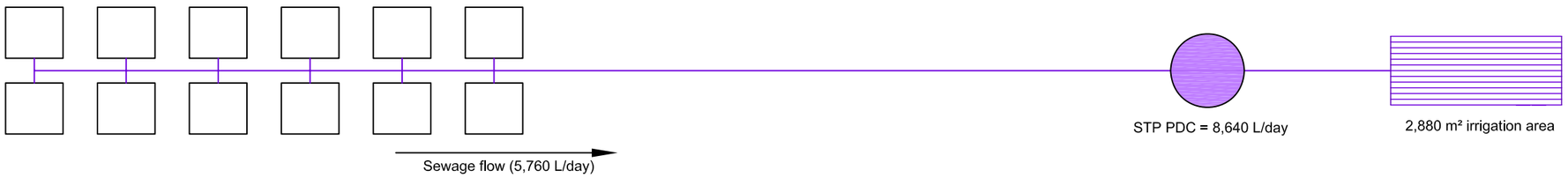

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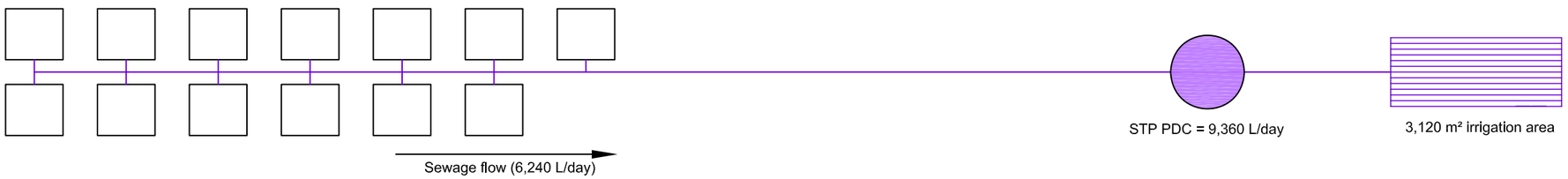

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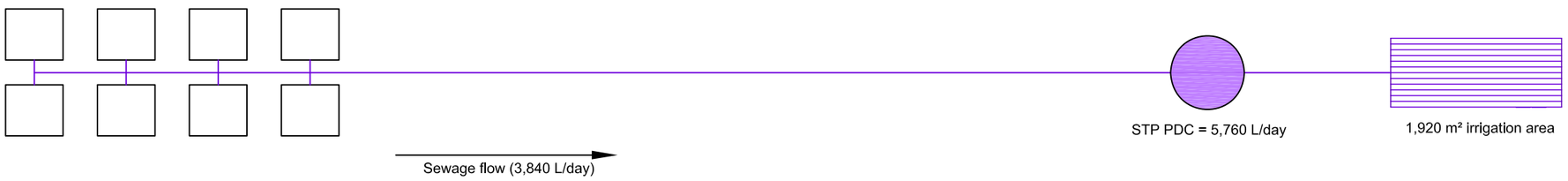

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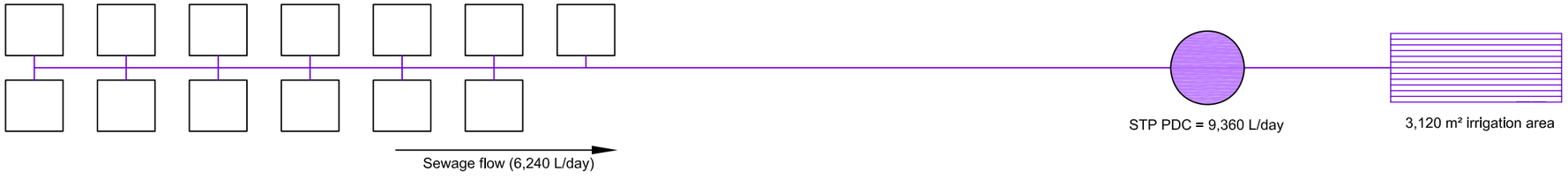

CLUSTER U

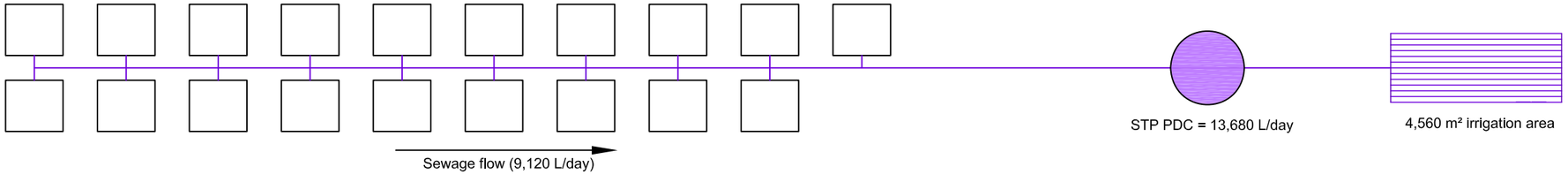

Figure notes:
1. STP PDC denotes sewage treatment plant peak design capacity
2. STP PDC has been calculated based on a nominal capacity of 150% of calculated sewage flows.

Client: NCV ENTERPRISES PTY LTD	Site location: MOUNT BURRELL (KUNGHUR), NEW SOUTH WALES		Real property description: VARIOUS - SEE REPORT		Drawing number: FIGURE 7D
					Drawing version: A
Project: ONSITE SEWAGE MANAGEMENT REPORT	Project number: PE2706.18	Scale: NOT TO SCALE	Drawn by: SG	Reviewed by: CB	Drawing title: FLOW PROCESS DIAGRAM 4
			Date drawn: 14,3,2019	Approved: CB	

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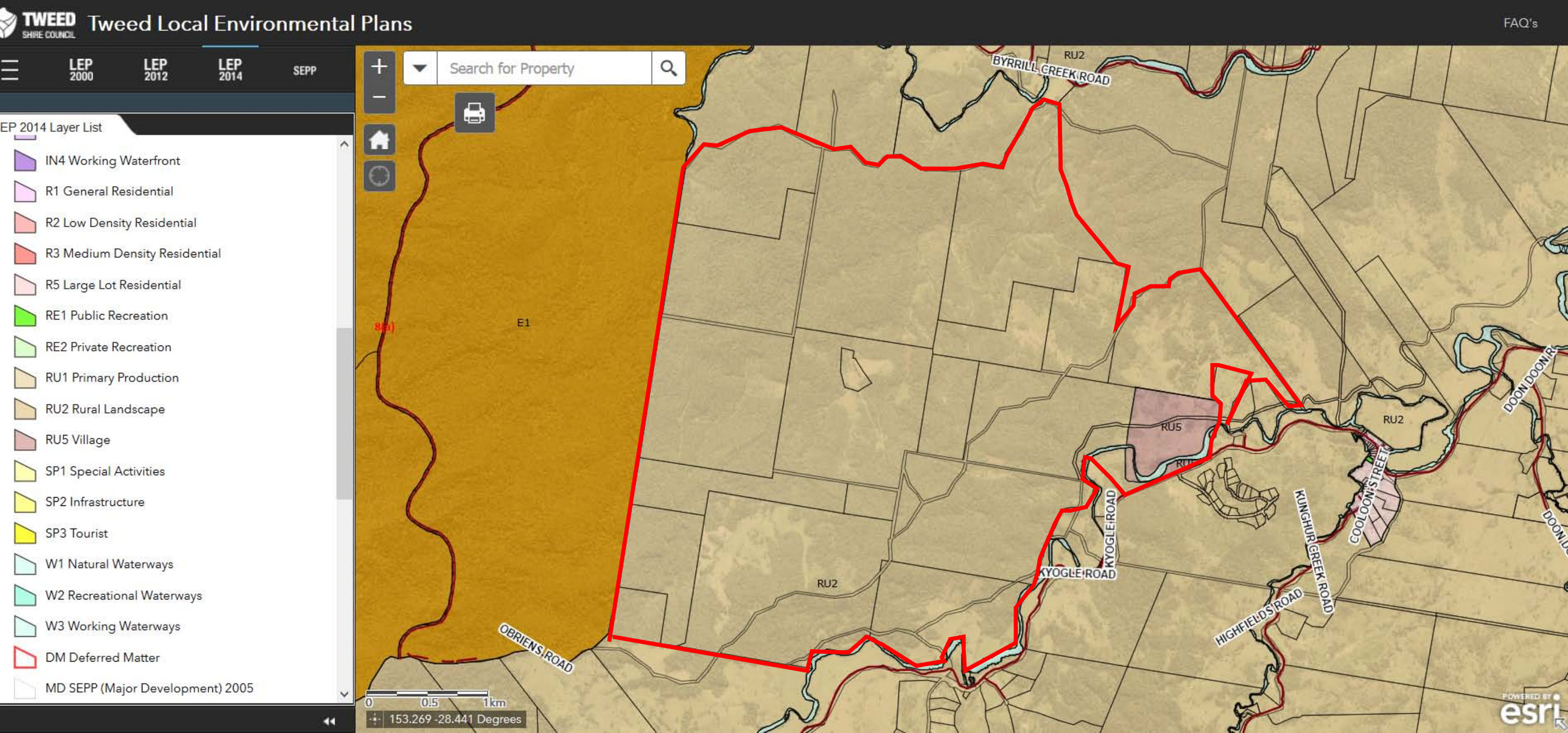
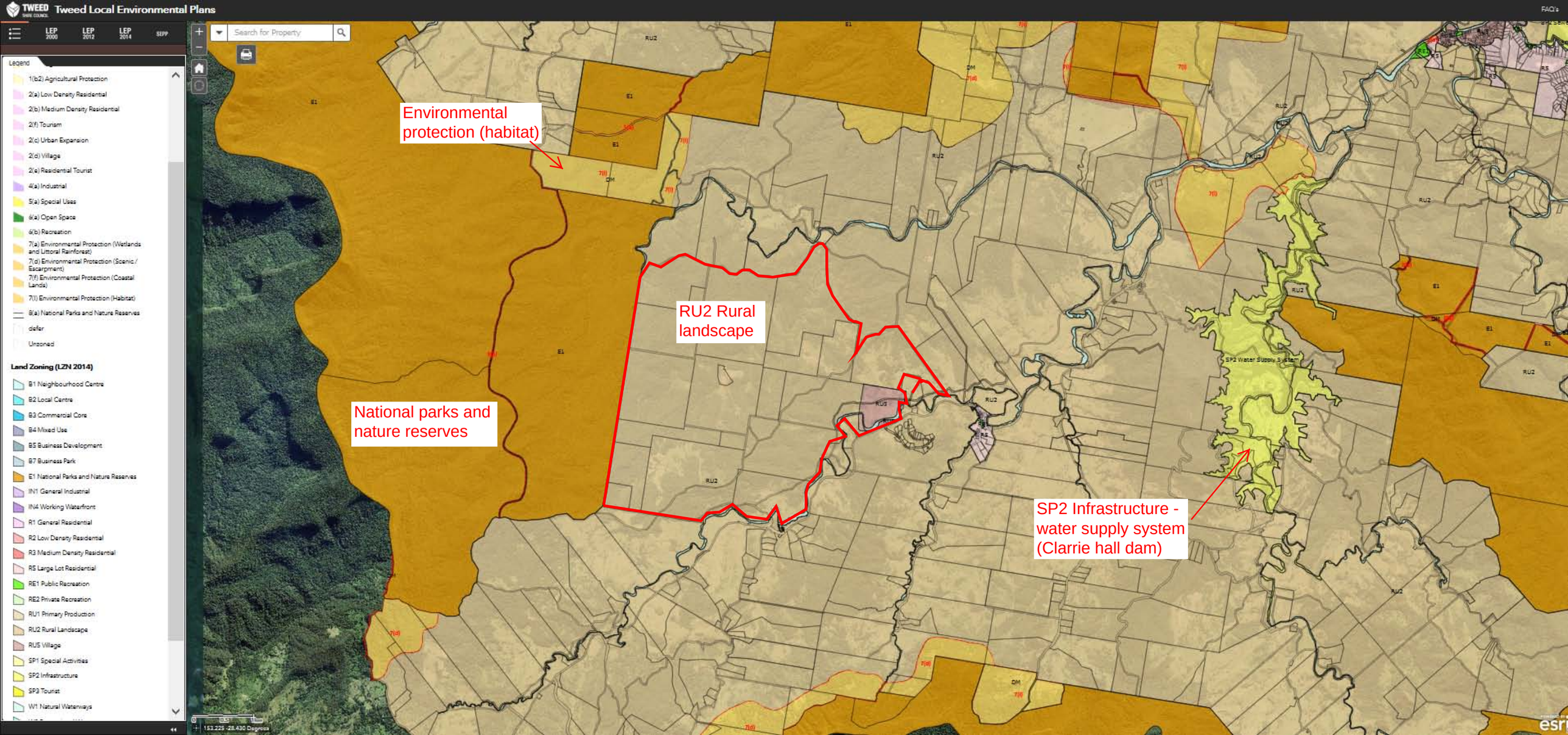
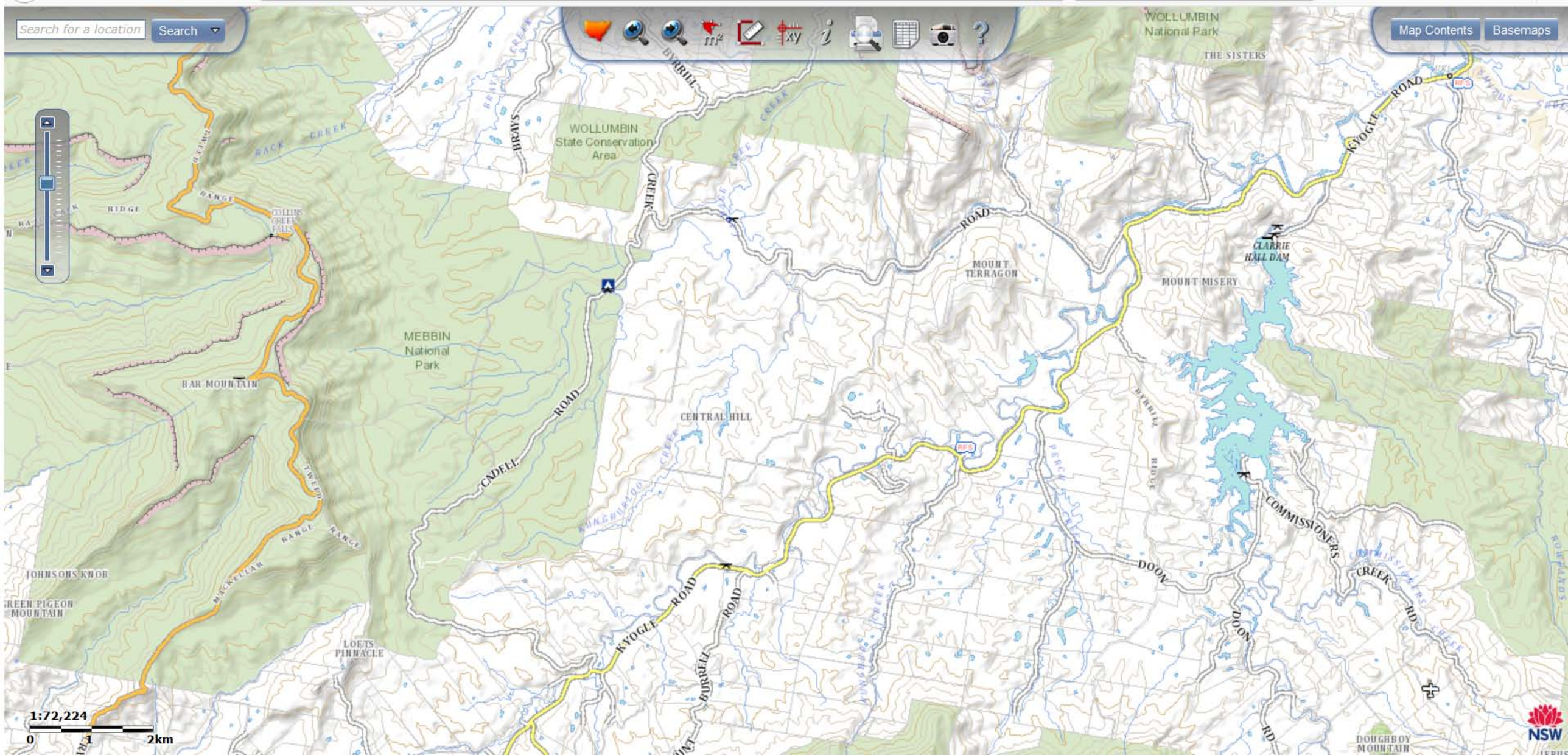
mail@preciseenvironmental.com.au

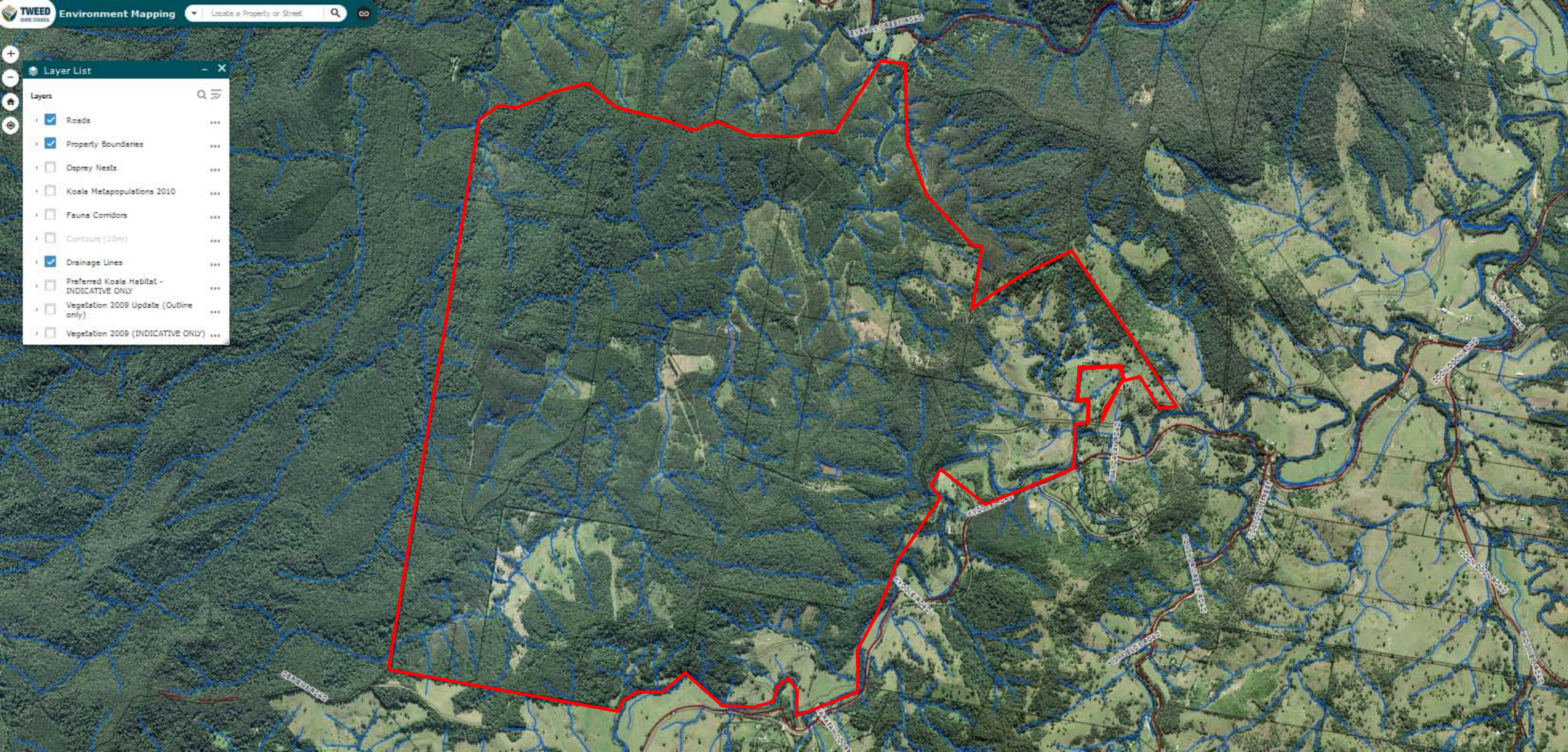
APPENDIX B – ENVIRONMENTAL MAPPING AND GROUNDWATER INFORMATION


TWEED SHIRE COUNCIL
Tweed Local Environmental Plans
FAQ's
LEP 2000
LEP 2012
LEP 2014
SEPP
EP 2014 Layer List
IN4 Working Waterfront
R1 General Residential
R2 Low Density Residential
R3 Medium Density Residential
R5 Large Lot Residential
RE1 Public Recreation
RE2 Private Recreation
RU1 Primary Production
RU2 Rural Landscape
RU5 Village
SP1 Special Activities
SP2 Infrastructure
SP3 Tourist
W1 Natural Waterways
W2 Recreational Waterways
W3 Working Waterways
DM Deferred Matter
MD SEPP (Major Development) 2005
Search for Property
E1
RU2
RU5
BYRRILL CREEK ROAD
KYOGLE ROAD
KUNGHUR CREEK ROAD
HIGHFIELDS ROAD
COOLOON ST
DOON DOON R
OBRIENS ROAD
0 0.5 1km
153.269 -28.441 Degrees
POWERED BY esri


Tweed Local Environmental Plans
LEP 2000
LEP 2012
LEP 2014
SEPP
Search for Property
Legend
1(b2) Agricultural Protection
2(a) Low Density Residential
2(b) Medium Density Residential
2(f) Tourism
2(c) Urban Expansion
2(d) Village
2(e) Residential Tourist
4(a) Industrial
5(a) Special Uses
6(a) Open Space
6(b) Recreation
7(a) Environmental Protection (Wetlands and Littoral Rainforest)
7(d) Environmental Protection (Scenic / Escarpment)
7(f) Environmental Protection (Coastal Lands)
7(l) Environmental Protection (Habitat)
8(a) National Parks and Nature Reserves
defer
Unzoned
Land Zoning (LZN 2014)
B1 Neighbourhood Centre
B2 Local Centre
B3 Commercial Core
B4 Mixed Use
B5 Business Development
B7 Business Park
E1 National Parks and Nature Reserves
IN1 General Industrial
IN4 Working Waterfront
R1 General Residential
R2 Low Density Residential
R3 Medium Density Residential
R5 Large Lot Residential
RE1 Public Recreation
RE2 Private Recreation
RU1 Primary Production
RU2 Rural Landscape
RU5 Village
SP1 Special Activities
SP2 Infrastructure
SP3 Tourist
W1 Natural Waterways
Environmental protection (habitat)
RU2 Rural landscape
National parks and nature reserves
SP2 Infrastructure - water supply system (Clarrie hall dam)
SP2 Water Supply System
153.225 -28.430 Degrees
esri


Search for a location
Search
Map Contents
Basemaps
WOLLUMBIN National Park
THE SISTERS
WOLLUMBIN State Conservation Area
BRAYS CREEK
BYRRILL CREEK
KYOGLE ROAD
MOUNT TERRAGON
CLARRIE HALL DAM
MOUNT MISERY
MEBBIN National Park
BAR MOUNTAIN
CANDELL ROAD
CENTRAL HILL
COMMISSIONERS CREEK RD
DOON DOON
JOHNSONS KNOB
GREEN PIGEON MOUNTAIN
LOETS PINNACLE
DOUGHBOY MOUNTAIN
1:72,224
0 1 2km
NSW

Wollumbin Conservation Park
Cedar Creek (North)
Mebbin National Park
Terragon
Doon Doon Creek
Byrrill Creek
Byrrill Creek
Culters Camp Rd
Pine Plot Rd
Peg in Stump Rd
Forty spurs Rd
Cadell Rd
Plantation Rd
1000 m
1147 m
Clarrie Hall Dam
Rowlands Creek
Giwah Rd
Tweed River
Kunghur
Perch Creek
Kunghur Creek
Mebbin
Obrians Rd
Mount Burrell
Kunghur Creek
Midginbil
Commissioners Creek
Mount Burrell Rd
Kunghur Creek Rd
Midginbil Rd
Johnstons Creek Rd
Rockface Rd
Mount Jerusalem National Park
Doon Doon
1
2km
NPSR, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, METI/NASA, NGA
esri


TWEED
Environment Mapping
Locate a Property or Street
Layer List
Layers
Roads
Property Boundaries
Osprey Nests
Koala Metapopulations 2010
Fauna Corridors
Contours (10m)
Drainage Lines
Preferred Koala Habitat - INDICATIVE ONLY
Vegetation 2009 Update (Outline only)
Vegetation 2009 (INDICATIVE ONLY)

Tweed River Catchment

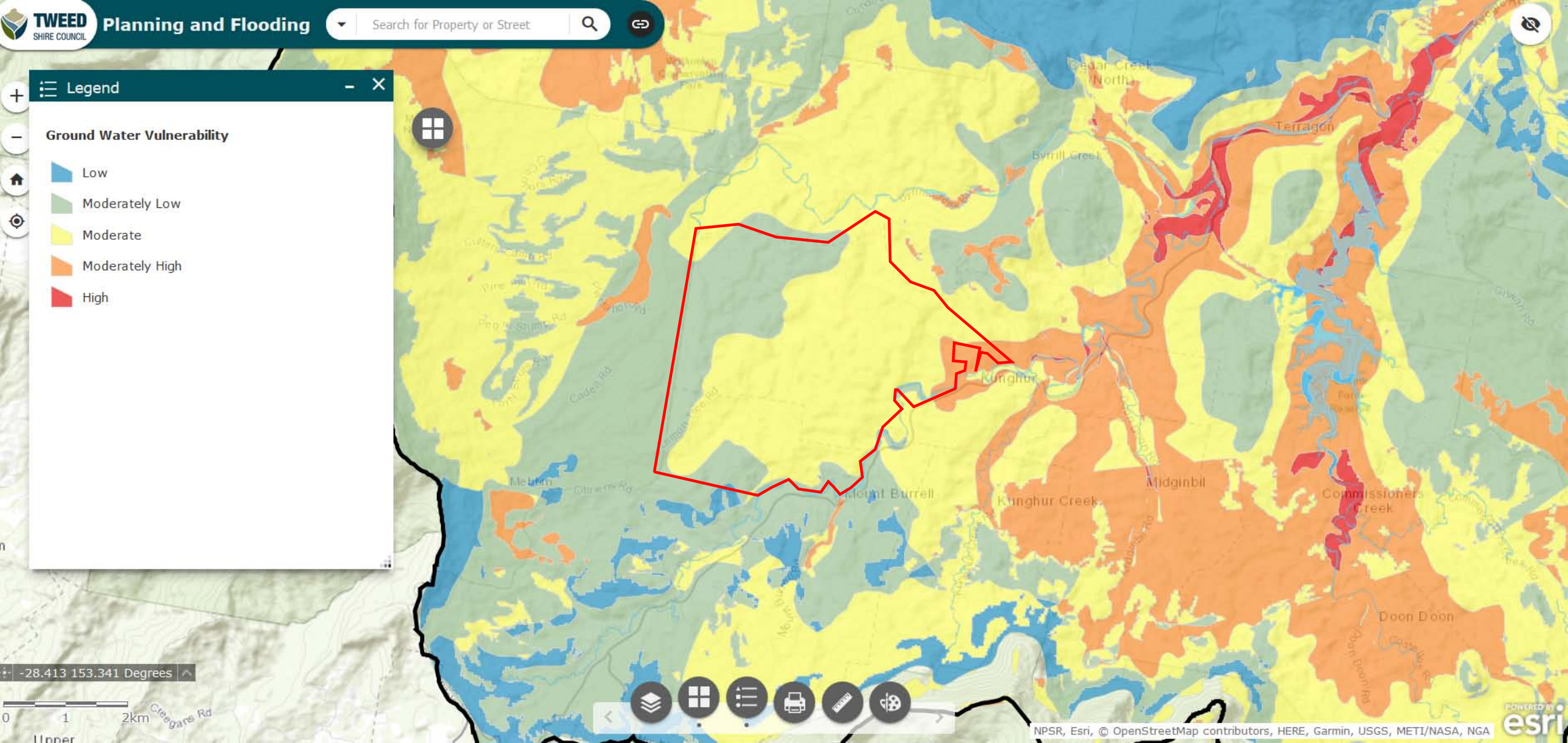
and small coastal creeks

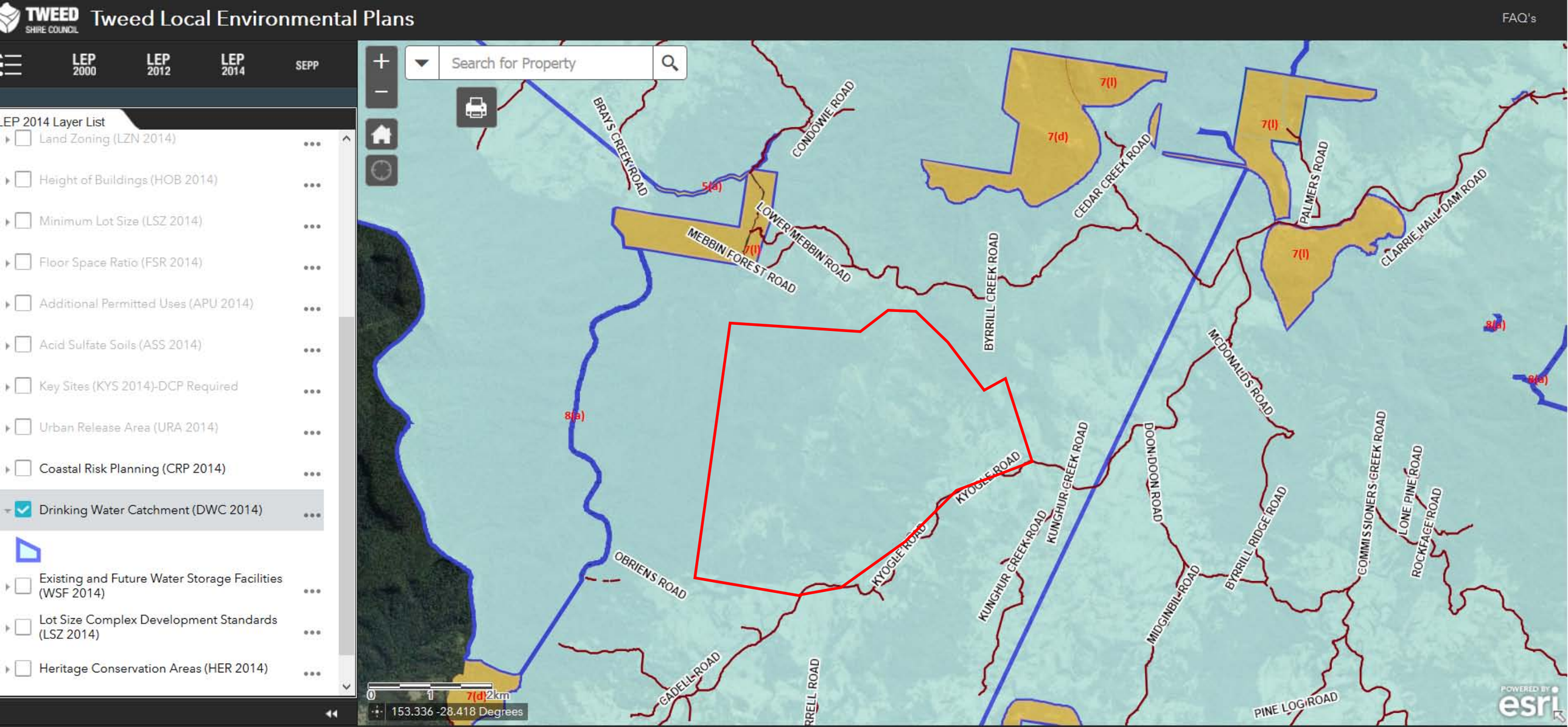
TWEED HEADS
Cobaki Broadwater
FINGAL
Terranora Broadwater
GLENGARRIE
Cobaki Creek
Bilambil Creek
Duroby Creek
TERRANORA
CHINDERAH
KINGSCLIFF
Tweed Broadwater
TUMBULGUM
Tweed River
Cudgen Creek
CONDONG
Cudgen Lake
BOGANGAR
Hopping Dicks Creek
Rous River
Crystal Ck
Nobby Ck
CHILLINGHAM
MURWILLUMBAH
Bray Park Weir
Oxley River
TYALGUM
HASTINGS POINT
Christies Creek
Dunbible Creek
POTTSVILLE
Cudgera Creek
UKI
Smiths Creek
TERRAGON
BURRINGBAR
Mooball Creek
MOOBALL
WOOYUNG
Crabbes Creek
Byrrill Creek
Clarrie Hall Dam
Doon Doon Creek
Rotands Creek
Tweed River

Major weirs, storages
Major storages
Uncontrolled streams
Waterways affected by urban development
Estuaries
Town water supply subcatchments
National Parks, Nature Reserves & State Forests
Mainly forested areas

0 5 10 15 Kilometres

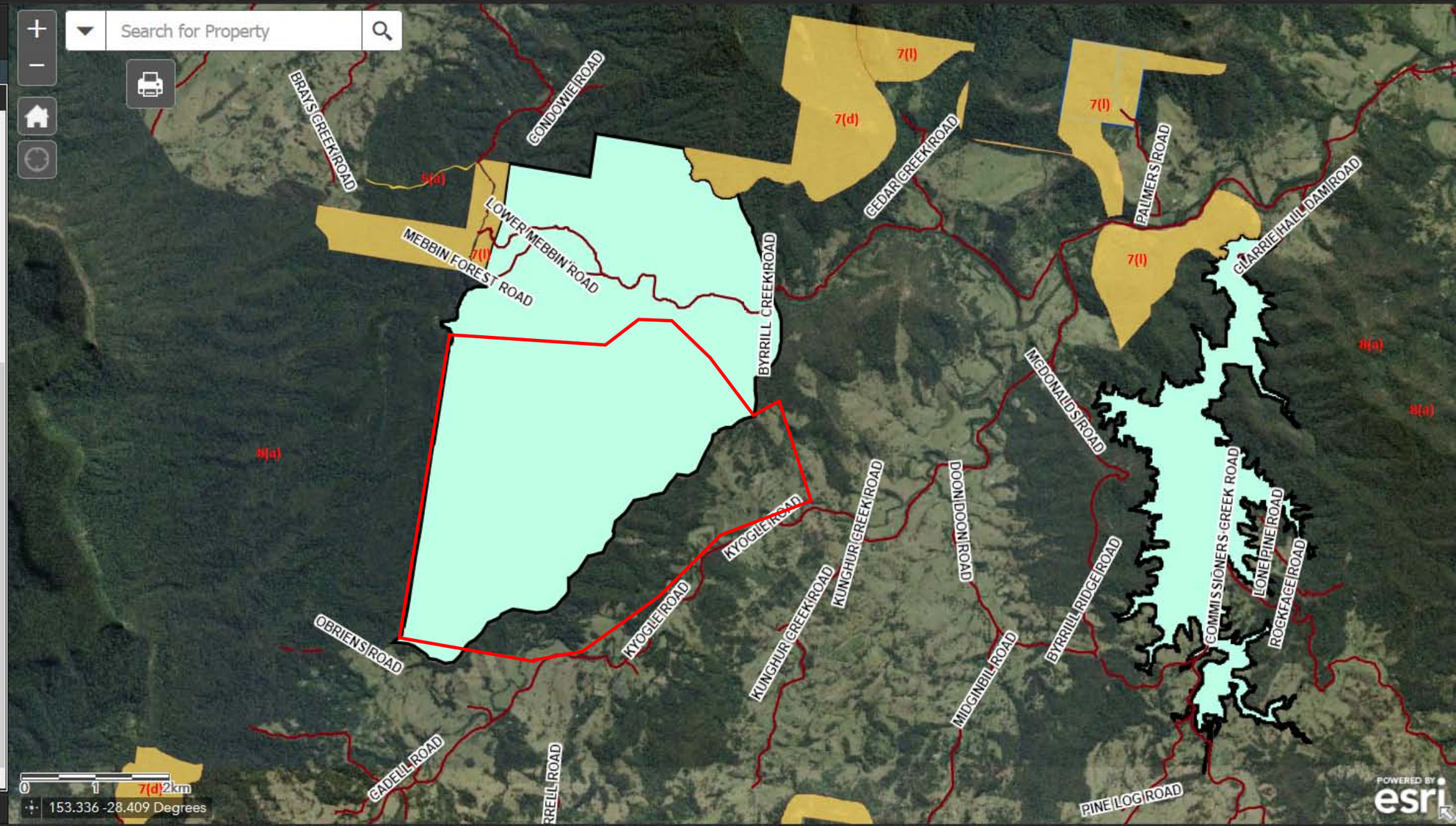
Prepared by NSW EPA's Remote Sensing / GIS Service


TWEED SHIRE COUNCIL
Planning and Flooding
Search for Property or Street
Legend
Ground Water Vulnerability
Low
Moderately Low
Moderate
Moderately High
High
Cedar Creek North
Terragon
Byrrill Creek
Kunghur
Midginbil
Kunghur Creek
Commissioners Creek
Mount Burrell
Doon Doon
Cades Rd
Creegans Rd
-28.413 153.341 Degrees
0
1
2km
NPSR, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, METI/NASA, NGA
esri


TWEED SHIRE COUNCIL
Tweed Local Environmental Plans
FAQ's
LEP 2000
LEP 2012
LEP 2014
SEPP
LEP 2014 Layer List
Land Zoning (LZN 2014)
Height of Buildings (HOB 2014)
Minimum Lot Size (LSZ 2014)
Floor Space Ratio (FSR 2014)
Additional Permitted Uses (APU 2014)
Acid Sulfate Soils (ASS 2014)
Key Sites (KYS 2014)-DCP Required
Urban Release Area (URA 2014)
Coastal Risk Planning (CRP 2014)
Drinking Water Catchment (DWC 2014)
Existing and Future Water Storage Facilities (WSF 2014)
Lot Size Complex Development Standards (LSZ 2014)
Heritage Conservation Areas (HER 2014)
Search for Property
BRAYS CREEK ROAD
CONDOWIE ROAD
MEBBIN FOREST ROAD
LOWER MEBBIN ROAD
CEDAR CREEK ROAD
PALMERS ROAD
CLARRIE HALL DAM ROAD
BYRRILL CREEK ROAD
MCDONALDS ROAD
DOON DOON ROAD
KYOGLE ROAD
KUNGHUR CREEK ROAD
BYRRILL RIDGE ROAD
COMMISSIONERS CREEK ROAD
LONE PINE ROAD
ROCKFAGE ROAD
MIDGINEIL ROAD
OBRIENS ROAD
CADELL ROAD
PINE LOG ROAD
7(l)
7(d)
5(a)
8(a)
0 1 2km
153.336 -28.418 Degrees
POWERED BY esri

LEP 2014 Layer List

- Height of Buildings (HOB 2014)
- Minimum Lot Size (LSZ 2014)
- Floor Space Ratio (FSR 2014)
- Additional Permitted Uses (APU 2014)
- Acid Sulfate Soils (ASS 2014)
- Key Sites (KYS 2014)-DCP Required
- Urban Release Area (URA 2014)
- Coastal Risk Planning (CRP 2014)
- Drinking Water Catchment (DWC 2014)
- Existing and Future Water Storage Facilities (WSF 2014)
- Lot Size Complex Development Standards (LSZ 2014)
- Heritage Conservation Areas (HER 2014)
- Heritage Items (HER 2014)



About
Content
Legend
Legend
Vegetation 2009 (Update)
Estuarine Complexes
Foredune Complex
Heathlands
Highly Modified / Disturbed
Melaleuca and Swamp She-oak Forests
Miscellaneous Map Units
Rainforest and Riparian Communities
Sclerophyll Forests / Woodlands on Sand Substrates and Alluvium
Sclerophyll Open Forests on Bedrock Substrates
Sedgelands and Related Communities
WaterwaysTSC - Waterways
General site area
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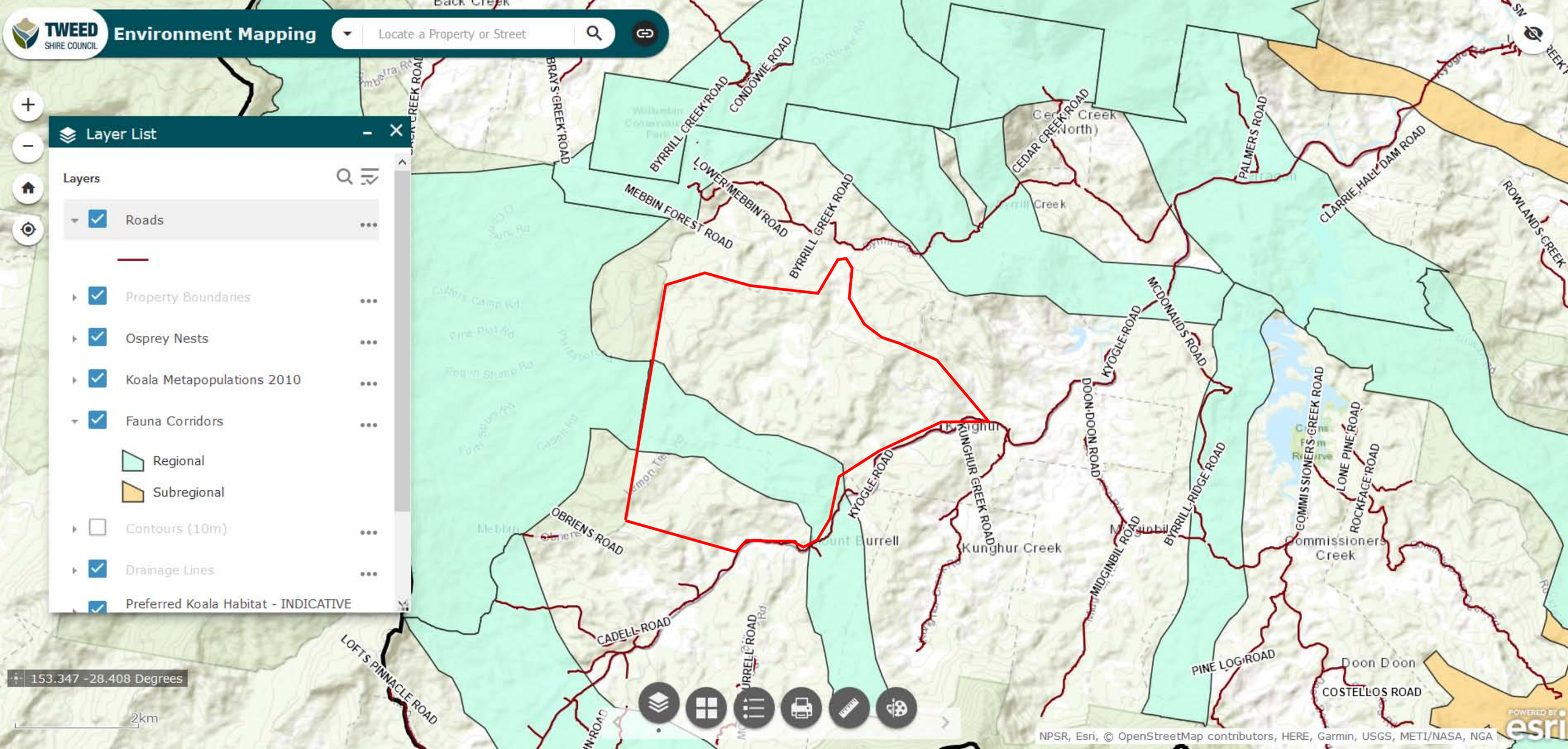
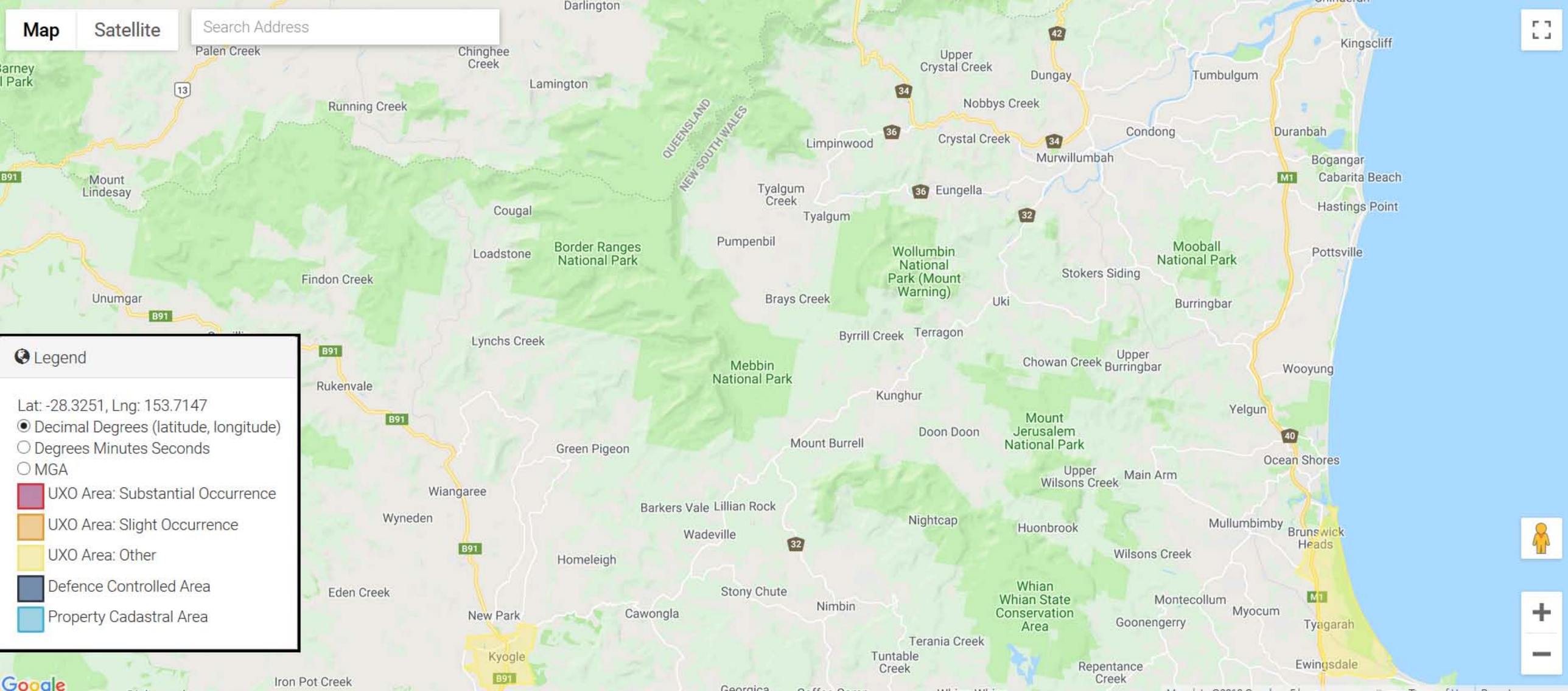
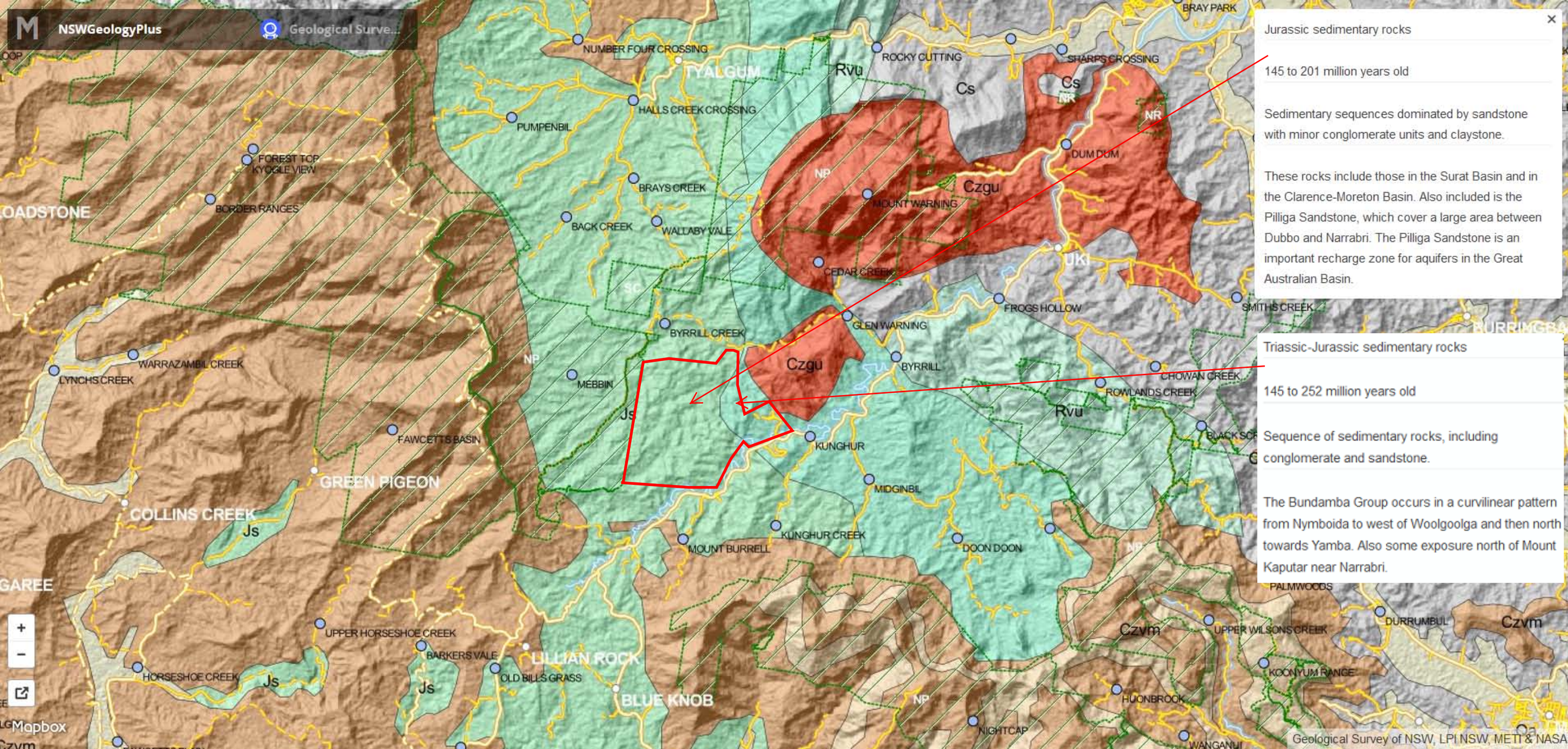
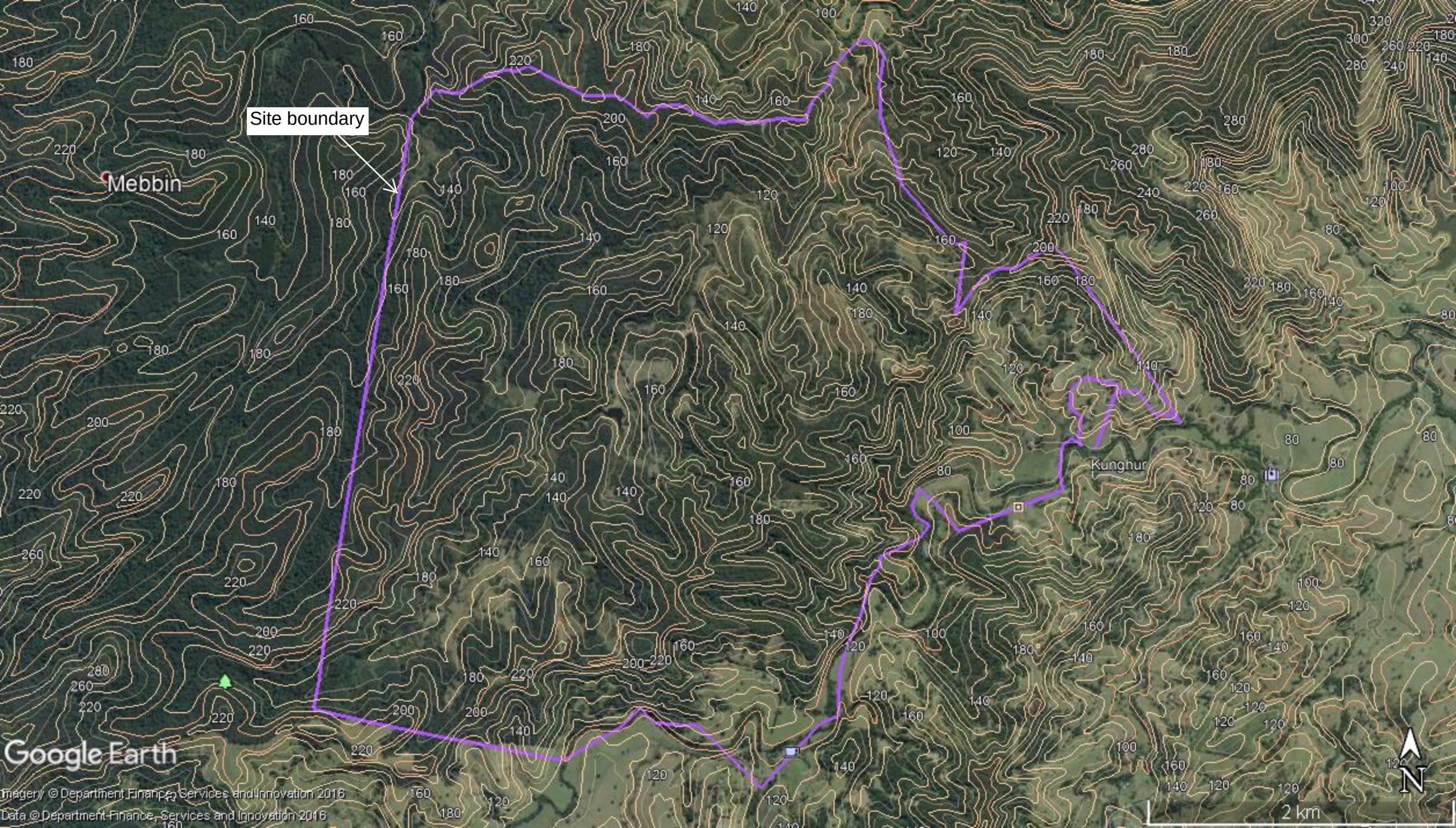

TWEED SHIRE COUNCIL
Environment Mapping
Locate a Property or Street
Layer List
Layers
Roads
Property Boundaries
Osprey Nests
Koala Metapopulations 2010
Fauna Corridors
Regional
Subregional
Contours (10m)
Drainage Lines
Preferred Koala Habitat - INDICATIVE
BYRRILL CREEK ROAD
CONDOWIE ROAD
BRAY'S CREEK ROAD
MEBBIN FOREST ROAD
LOWER MEBBIN ROAD
CEDAR CREEK ROAD
PALMER'S ROAD
CLARRIE HALL DAM ROAD
ROWLANDS CREEK
MCDONALD'S ROAD
KYOGLE ROAD
DOON DOON ROAD
KUNGHUR CREEK ROAD
BYRRILL RIDGE ROAD
COMMISSIONERS CREEK ROAD
LONE PINE ROAD
ROCKFACE ROAD
MIDGINBIL ROAD
OBRIENS ROAD
CADELL ROAD
BURRELL ROAD
LOFTS PINNACLE ROAD
PINE LOG ROAD
COSTELLOS ROAD
Kunghur Creek
Commissioners Creek
Doon Doon
153.347 -28.408 Degrees
2km
NPSR, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, METI/NASA, NGA


Map
Satellite
Search Address
Legend
Lat: -28.3251, Lng: 153.7147
Decimal Degrees (latitude, longitude)
Degrees Minutes Seconds
MGA
UXO Area: Substantial Occurrence
UXO Area: Slight Occurrence
UXO Area: Other
Defence Controlled Area
Property Cadastral Area
Darlington
Palen Creek
Chinghee Creek
Lamington
Running Creek
Upper Crystal Creek
Dungay
Kingscliff
Tumbulgum
Nobbys Creek
Limpinwood
Crystal Creek
Murwillumbah
Condong
Duranbah
Bogangar
Cabarita Beach
Hastings Point
Pottsville
Mount Lindesay
QUEENSLAND
NEW SOUTH WALES
Tyalgum Creek
Tyalgum
Eungella
Cougal
Pumpenbil
Loadstone
Border Ranges National Park
Wollumbin National Park (Mount Warning)
Mooball National Park
Stokers Siding
Findon Creek
Unumgar
Brays Creek
Uki
Burringbar
Byrrill Creek
Terragon
Lynchs Creek
Chowan Creek
Upper Burringbar
Wooyung
Mebbin National Park
Rukenvale
Kunghur
Yelgun
Mount Jerusalem National Park
Doon Doon
Mount Burrell
Green Pigeon
Ocean Shores
Upper Wilsons Creek
Main Arm
Wiangaree
Barkers Vale
Lillian Rock
Nightcap
Huonbrook
Mullumbimby
Brunswick Heads
Wyneden
Wadeville
Homeleigh
Wilsons Creek
Eden Creek
Stony Chute
Nimbin
Whian Whian State Conservation Area
Montecollum
Myocum
Tyagarah
New Park
Cawongla
Goonengerry
Terania Creek
Kyogle
Tuntable Creek
Repentance Creek
Ewingsdale
Iron Pot Creek
Google


NSWGeologyPlus
Geological Surve...
Jurassic sedimentary rocks
145 to 201 million years old
Sedimentary sequences dominated by sandstone with minor conglomerate units and claystone.
These rocks include those in the Surat Basin and in the Clarence-Moreton Basin. Also included is the Pilliga Sandstone, which cover a large area between Dubbo and Narrabri. The Pilliga Sandstone is an important recharge zone for aquifers in the Great Australian Basin.
Triassic-Jurassic sedimentary rocks
145 to 252 million years old
Sequence of sedimentary rocks, including conglomerate and sandstone.
The Bundamba Group occurs in a curvilinear pattern from Nymboida to west of Woolgoolga and then north towards Yamba. Also some exposure north of Mount Kaputar near Narrabri.
Czgu
Rvu
Cs
Js
Czvm
NP
NR
SC
NUMBER FOUR CROSSING
TYALGUM
HALLS CREEK CROSSING
PUMPENBIL
FOREST TOP
KYOGLE VIEW
BORDER RANGES
BRAYS CREEK
BACK CREEK
WALLABY VALE
ROCKY CUTTING
SHARPS CROSSING
DUM DUM
MOUNT WARNING
CEDAR CREEK
UKI
FROGS HOLLOW
SMITHS CREEK
GLEN WARNING
BYRRILL CREEK
BYRRILL
MEBBIN
WARRAZAMBIL CREEK
LYNCHS CREEK
FAWCETTS BASIN
GREEN PIGEON
COLLINS CREEK
KUNGHUR
MIDGINBIL
KUNGHUR CREEK
MOUNT BURRELL
DOON DOON
CHOWAN CREEK
ROWLANDS CREEK
PALMWOODS
DURRUMBUL
UPPER WILSONS CREEK
KOONYUM RANGE
HUONBROOK
NIGHTCAP
WANGANUI
UPPER HORSESHOE CREEK
BARKERS VALE
OLD BILLS GRASS
LILLIAN ROCK
BLUE KNOB
HORSESHOE CREEK
Mapbox
Geological Survey of NSW, LPI NSW, METI & NASA


Site boundary
Mebbin
Kunghur
Google Earth
Imagery © Department Finance, Services and Innovation 2016
Data © Department Finance, Services and Innovation 2016
N
2 km

APPENDIX C – EXAMPLE SEWAGE TREATMENT SYSTEMS

Made In Australia

Taylex Tanks

Since 1969

Wastewater & Rainwater Specialists

On-Site Wastewater Treatment Solutions

Concrete & Plastic

Taylex has a system for every Australian effluent category

1300 TAYLEX **www.taylex.com.au**

About Taylex

Taylex was founded in 1969 and was the first company to manufacture Aerobic Wastewater Treatment Systems (AWTS) in Australia. Taylex continues to lead the field in both precast concrete and rotational moulding manufacturing, design & installation of Rainwater Tanks and Aerobic Wastewater Treatment Systems (AWTS) or Home Sewage Treatment Plants (HSTP).

Taylex has a National Distribution Network which is supported by factory trained licensed distributors. Our distributors can supply, install, service and maintain our range of both concrete and plastic products from Tasmania to Darwin, Perth to Brisbane. We manufacture all our own concrete and plastic products.

Taylex is a Quality Assured Company that works under ISO 9001. Our range of products carries all relevant State Government Approvals throughout Australia.

Installation & Commissioning

Your Taylex consultant will project manage your install with your builder and plumber. They will advise on and discuss matters with you that may affect the final outcome for you (eg sub-surface rock, positioning of tanks, etc.). This ensures a trouble free install with maximum aesthetic value and minimal environmental impact. After the install your builder will go about his job until your house is finished. Please make sure your builder arranges a commissioning date for your system at least 2 weeks prior to your move in date.

Servicing

Home Sewage Treatment Plants are required by law to be serviced on a regular basis (normally quarterly unless otherwise stated). Your Local Council will enforce these laws. Systems may only be serviced by registered licensed wastewater service personnel. At Taylex our friendly servicemen will attend your new plant free of charge for the first 12 months. After the first year you can renew your service contract with us on a yearly basis.
Please note: All aerated and septic systems need to be pumped out depending on usage. On average most Taylex systems need to be pumped out between 7 to 10 years. Any claims by other companies that their tanks never have to be pumped out are incorrect as some solid matter that households produce cannot be digested or dissolved.

15 Year Warranty

Every Taylex concrete or plastic system is covered by a full manufacturer's warranty. IMPORTANT: The Taylex 15 year warranty on both concrete and plastic vessels (tanks) extends to the internal compartment walls as they are poured or moulded in one piece and can never dislodge. A 3 year* warranty on all electrical and mechanical components including the irrigation pump (*12 month standard warranty and a further 24 months extended warranty when you purchase your 2nd & 3rd years of service calls with a Taylex Approved Service Provider). Warranties apply from the date of commissioning or 90 days from the date of installation (whichever is sooner).

Taylex Tanks are purpose built - As A One Piece Moulded Unit

Eliminating any leakage caused by movement of internal walls - a common problem with other tanks that have mortar or silicone joints internally. This would allow contamination between compartments, hindering the treatment process and allowing untreated water to be irrigated into your garden. TAYLEX TANKS NEVER REQUIRE A REBUILD. We believe we make the best concrete and plastic vessels for a treatment system in Australia.

Taylex Tanks are Full Wall Tanks and larger than most.

The period of time effluent is able to process in your tank is the secret to producing quality effluent. Our tanks can accommodate more water so your effluent is consistantly treated for longer – even on high usage days. This accommodates for growth of your family and when visitors arrive. The walls in each compartment extend to the top of the tank so shock loads of effluent will not flood the tank and result in cross contamination of the compartment contents.

Monitoring and Alarms

Taylex Systems all have two alarms systems by law (1 x Audible & 1 x Visual). This will alert you to a problem and prompt you to call in a Service Technician or consult your Home Owner's Manual (provided in the control box on your tank, our website or available by calling our service department). Once you are aware of the problem you can mute the alarm while you wait for the serviceman. It cannot be forgotten as it will reactivate every 24 hours until a remedy has been found.

We have chosen not to have the monitoring system placed in your house to reduce inconvenience to you. The Taylex Systems are large enough that it is unnecessary to wake a sleeping family in the middle of the night. It also allows our servicemen to work on your system if you are not at home should a breakdown ever occur.

Power Usage & Diagnostic Controllers

While the Taylex vessels (tanks) are suitable for a large house the "systems" can be turned down electrically to cater for the individual household usage. The Advanced Blower System uses controllers that have the ability to turn the air blower on and off during the hour if required - unlike other units that run 24 hours a day. This can be changed as the needs of the household change (if the household grows or diminishes.) Your friendly servicemen will monitor the health of the system and adjust the running time if required.

Taylex have a System for every Australian Effluent Standard.

Please see the matrix to the right which outlines all our systems to determine which one produces the effluent quality required for your property. Your Local Distributor is always available to discuss your requirements with you.

Concrete & Plastic Tanks
15 Year Tank Warranty Includes Internal Compartment Walls... Plus 3 Years Electrical Components Warranty*

*ABS and MAXI Systems Only

On-Site Sewage Treatment

Effluent Categories in Australia

Taylex has a system for every effluent category

Effluent Grade	Primary (Septic) / Advanced Primary (Septic)	Secondary	Advanced Secondary +Nutrient Reduction
Environmental Grade Min. Australian Standard Requirements	★ ★★	★★★	★★★★½

Taylex Systems

	Concrete OR Plastic		Concrete OR Plastic *Our Most Popular System*
1 - 8 Bedrooms	3900Lt 7100Lt MAXI	~~COMPACT~~ Discontinued	ABS Advanced Blower System
6 - 10 Bedrooms	7100Lt 10000Lt MAXI	DELUXE	2 x ABS
Commercial	Taylex Standard and Custom Designed Commercial Systems - Please speak to your Sales Consultant		

Specifications

Fact Sheets Available on subsequent pages of this brochure

Tank Construction Concrete Plastic	✓ –	✓ ✓	✓ –	✓ ✓
Irrigation Area Above Ground Below Ground Subject to Council Approval	 ✓	 ✓	✓ ✓	✓ ✓
Tank Configuration Number of Tanks	Up To 3 Tanks	1 Tank	2 Tank	1 Tank
Total Tank Capacities		7,100Lt	4,000Lt 5,300Lt	Concrete 9,320Lt Plastic 7,100Lt
Disinfection	Nil	Nil	Chlorine*	Chlorine* or UV Light - No Chemical
Installation	✓	✓	✓	✓
Service Costs *These prices may vary from area to area	Nil	Nil	$260-450 p/a (4 Services)	$260-450 p/a (2-4 Services)
Electricity Usage	.5kW If required	.5kW If required	3+kW	1.5 - 3kW**

* While Chlorine is used as a disinfectant, the output levels are no greater than a standard swimming pool.

** This system can be timed depending on the amount of waste water produced by the household

Australian Standards Requirement with Taylex Results

Effluent Grade	Primary / Septic	Secondary	Advanced Secondary +Nutrient Reduction	
	Australian Standard	Australian Standard	Australian Standard	TAYLEX ABS
BOD_5 Biological Oxygen Demand Over 5 Days	120 - 240mg/L	<20mg/L	<10mg/L	<1.85mg/L
TSS Total Suspended Solids	65 - 180mg/L	<30mg/L	<10mg/L	<5.19mg/L
Thermotolerant Coliforms	n/a	<200/100mL	<10/100mL	<0.783/100mL
Nitrogen	n/a	n/a	n/a	<25mg/L
Phosphorus mg/L	n/a	n/a	n/a	<5mg/L
Turbidity* Clarity	>13NTU	n/a	n/a	5.22NTU

Official Independant 6 Month Test Results

In comparison

*The WHO (World Health Organization), establishes that the turbidity of drinking water shouldn't be more than 5 NTU, and should ideally be below 1 NTU.

Taylex™ ABS One Piece Plastic or Concrete Tank

Why install a Taylex™ ABS?
If you live in an unsewered area, you will be required to install a system to treat your wastewater. It is your responsibility to ensure that you protect your family and the environment from potentially harmful substances. By installing a Taylex™ ABS you will be ensuring that you treat all your household wastewater to the highest level available. The treated effluent from a Taylex™ ABS is classified as advanced secondary which means that it is approximately 65 times cleaner than septic tank effluent, (which cannot be used for irrigation as it is a Health Hazard) and at least 5 times cleaner than effluent from most other treatment systems.

What makes the Taylex™ ABS different from other systems?
The Taylex™ ABS is a specially designed and manufactured one tank system that is made from either concrete or plastic. All of the internal walls are poured or moulded at the same time as the outer wall. We use steel reinforcing to make our concrete tank extremely strong and durable and fireproof. We use sandwiched closed cell polymer foam to make our plastic tank light, strong and durable. We do not use sealants or glues to seal our chambers as these will fail over time resulting in contamination of the treated effluent. We also do not use flimsy materials inside our tanks for walls or baffles. Our systems are designed to last as long as your house without ever having to be structurally rebuilt.

The Taylex™ ABS does not need more than one tank to achieve its extremely clean effluent quality. We have found by experience that two or three tank systems have the disadvantage of buried interconnecting pipework which can fail during backfilling and subsequent earth subsidence and compaction, resulting in raw sewage entering the environment and endangering your family's health.

Full Wall Construction
Both the concrete and plastic tank has been manufactured with internal walls that extend to the lid of the tank. This creates a larger than average buffer area to accommodate shock loads of waste that would normally cause flooding and contamination in a system. The lid of the tank contacts the top of the chamber walls to prevent solids transfer within the tank.

Self Anchoring Tank
The plastic tank is built with anti-floatation protrusions incorporated into the design. There is no need for chains or concrete to hold the tank in the ground. The concrete tank is 6.25 tonne which is enough weight to stop the tank from floating under normal operation.

Low Occupancy Mode and Self Diagnostic Control Panel
Taylex™ has designed its control panels to be self diagnostic. An alarm code will be displayed if anything abnormal occurs within your Taylex™ ABS. A phone call to your local service technician may be all that is required to rectify the situation, saving you time and money. The blower operation time is programmable at the control panel and run times can be varied to suit the number of people in the home and therefore reducing electricity usage.

Effluent Disposal Fields - (Irrigation)
Your local council will stipulate the type effluent disposal allowable in your area. Ask your Taylex Distributor to organise an essential Wastewater Disposal Report to ascertain if surface or sub-surface irrigation is to be used.

The 5 Step Process

Step 1: All wastewater from the home flows by gravity into the primary pre-treatment chamber of the Taylex™ ABS, and then into the secondary pre-treatment chamber by way of a mid-water take off. Solids are allowed to settle to the bottom of these chambers and a crust forms on the top. This naturally occurring crust stops odour from escaping from these chambers. Anaerobic (no oxygen) bacteria establish themselves in these chambers and partially digest the organic matter. Any untreatable and potentially harmful solids are retained within these chambers. The mid-water liquor between the bottom sludge based layer and the surface crust then flows by displacement into the aeration chamber.

Step 2: Air is introduced into the aeration chamber by way of a silent Blower with a Taylex™ air diffuser located at the bottom of the chamber. Aerobic (oxygen loving) bacteria proliferate and digest most of the remaining organic material. Fixed biomedia assist the retention and growth of the biomass.

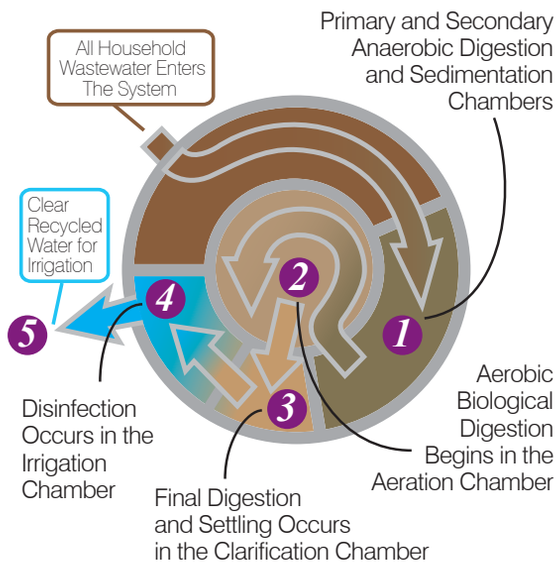
Step 3: The liquid then flows into the clarification chamber for final settling. Sludge is removed from this chamber via an air sludge lift and is returned to the primary pre-treatment chamber for further treatment.

Step 4: The treated effluent passes through the Taylex™ TFG plate filter to settle out any floating solids and then through a solid chlorine tablet chlorinator, or UV light* to kill any viruses or pathogens that may remain in the treated effluent. The treated effluent is stored in the irrigation chamber until sufficient water activates the automatic submersible irrigation pump via a float switch.

Step 5: The automatic irrigation pump returns the treated effluent to the irrigation field for reuse in the environment.

Australian Standards & Test Results

Effluent Grade	Advanced Secondary	
	Australian Standard	TAYLEX ABS
BOD5 Biological Oxygen Demand Over 5 Days	<10 mg/L	<1.85mg/L
TSS Total Suspended Solids	<10 mg/L	<5.19mg/L
Thermotolerant Coliforms	<10/100mL	<0.783/100mL
Nitrogen	n/a	<25mg/L
Phosphorus g/m3	n/a	<5mg/L
Turbidity Clarity	n/a	5.22NTU


All Household Wastewater Enters The System
Primary and Secondary Anaerobic Digestion and Sedimentation Chambers
Clear Recycled Water for Irrigation
1
2
3
4
5
Disinfection Occurs in the Irrigation Chamber
Final Digestion and Settling Occurs in the Clarification Chamber
Aerobic Biological Digestion Begins in the Aeration Chamber

Our Most Popular System

Sewage Treatment Plant

Taylex™ ABS Advanced Blower System

An Advanced Secondary Aerated Wastewater Treatment System

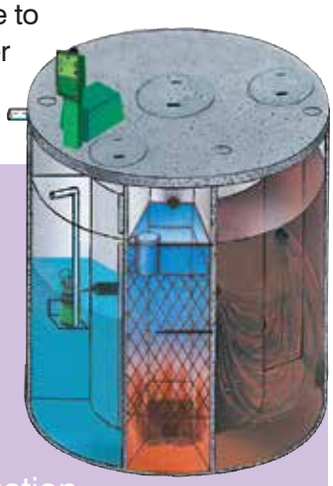
SOLAR POWER COMPLIANT

Concrete *or* Poly

The Taylex ABS is suited to approximately 90% of all domestic installations throughout Australia.

Purchasing this system gives you an automatic upgrade to ***Advanced Secondary*** treated effluent.

This higher grade effluent system not only produces better quality water, but also offers ***power saving***, ***silent operation*** and now chemical free disinfection (if required) at a similar price to most other secondary (lower effluent grade) systems on the market.



Even Our Standard System is Advanced!

Clear, odourless, recycled water for irrigation

Standard Tank All CONCRETE Vessel	**10EP**	**8EP**
Height	2300mm	2300mm
Tank Diameter	2450mm	2450mm
Maximum Dry Weight	6.25 tonnes	6.25 tonnes
Max. Hydraulic Loading	2,000Lt/day (10 Person -13 Persons Qld Only)	1,200Lt/day (8 Persons)
Operating Capacity	5,880Lt	5,009Lt
Total Tank Capacity	9,320Lt	9,320Lt

Also available: **Tall Tank versions 300, 400 & 800 (Weight 8-9 tonnes) & custom built Risers for deep inverts**

STATE APPROVAL NUMBERS - Taylex Concrete Advanced Blower System

Queensland	17/2015 Chlorine -16/2015 UV
New South Wales	AWTS 026
Victoria	Global Cert. 040/8
Northern Territory	05/16
South Australia	WWP-59/15 & WWP-19/15
Western Australia	F-AA-51817
Tasmania	DOC/16/52075

Concrete Tank Inverts
From Ground Level

Std	670mm
Tall 300	970mm
Tall 400	1070mm
Tall 800	1470mm

For 8EP Tanks ADD 200mm

The Taylex Poly ABS is the world's first multi-chambered monolithic plastic tank built light and strong using a sandwiched, closed cell foam polymer manufacturing method. No welded seams.

When is a Poly Tank required?

The low weight of a poly tank makes it ideal

- for difficult access sites - eg. steep or
- if cranes are not easily available

Your Taylex Distributor will recommend the most suitable tank for your site.

Self Anchoring Advanced System

Clear, odorless, recycled water for irrigation

Standrd Tank All PLASTIC Vessel	**10EP**	**8EP**
Height	2500mm	2500mm
Tank Footprint - Base	2400mm x 2530mm both	
Tank Diameter - Lid	2100mm	2100mm
Maximum Dry Weight	470kg *	470kg *
Max. Hydraulic Loading	2,000Lt/day (10 Person -13 Persons Qld Only)	1,200Lt/day (8 Persons)
Operating Capacity	6,066Lt	5024Lt
Total Tank Capacity	7,100Lt	7,100Lt

* Allow 600kg as all tanks are water tested

STATE APPROVAL NUMBERS - Taylex Poly Advanced Blower System

Queensland	17/2015 Chlorine -16/2015 UV
New South Wales	AWTS 036
Victoria	Global Cert. 040/10
Northern Territory	05/16
South Australia	2012-08191 & WWP-18/15
Western Australia	F-AA-51817
Tasmania	DOC/16/52075

Poly Tank Inverts
From Ground Level
550mm
For 8EP Tanks ADD 200mm

15 Year Tank Warranty Includes Internal Compartment Walls... Plus 3 Years Electrical Components Warranty

1300 TAYLEX **www.taylex.com.au**

Taylex ABS Accreditation - Concrete

PRODUCT CERTIFICATION

GLOBAL CERTIFICATION PTY LTD

Certificate of Conformance

Product Performance Testing

AS/NZS 1546.3:2008

Number: 040/8

This Certificate of Conformance to the Product Certificate Scheme for "Domestic Wastewater Treatment Units (Septic Tanks) and Rainwater Tanks" remains the property of Global Certification Pty. Ltd. and is granted subject to the terms and conditions of the Contract Application, in respect of the Product certified on this page and the attached schedule to the Certification of Conformance, bearing the same number as this certificate.

Company: **TAYLEX INDUSTRIES PTY LTD**

Head Office Address: **56 PRAIRIE ROAD, ORMEAU QLD 4208**

Recertification Date: **10 April 2016**

Expiry Date: **11 July2021**

Product Certified:

Tank Type	Description	Total Size	Working Capacity	Additional Product Information	Manufacture & Assembly Points
Concrete ABS	Product manufactured using Collection Wells A,B, C,D,E,F,H,I,J total tank capacity 9,320 Lts, or using G & K Collection Wells total tank capacity 11,062 Lts. Secondary with Nutrient reduction at 53.71% for nitrogen and phosphorus removal at the 8EP and 10EP level using Chlorine as the disinfectant method.	9,320 Lt Or 11,062 Lt	10EP 5,880 Lt 8EP 5009 Lt	Over the test period the average results were: *BOD_5 1.0 g/m^3* *TSS 6.44 g/m^3* *Total Nitrogen 24.9mg/L* *Total phosphorus 2.5mg/L* *E.Coli and faecal coliform ND in any sample at the dilutions tested* *Turbidity 6.25 NTU* *Dissolved Oxygen 5.6 mg/L* *Average Aeration Chamber Temperature 21.05°C*	Manufactured and assembled at: 56 Prairie Road ORMEAU QLD 4208

5 November 2010

Certification Date

Bruce Smith Director

Signed for and on behalf of Global Certification Pty Ltd

PO Box 195, Morayfield QLD 4506

DATE OF ISSUE: 11 July 2016

JAS-ANZ

www.jas-anz.com.au/register

© Global Certification Pty. Ltd. GC0050B R1 May 2013 Page 1

Taylex ABS Accreditation - Poly

PRODUCT CERTIFICATION

GLOBAL CERTIFICATION PTY LTD

Certificate of Conformance

Product Performance Testing

AS/NZS 1546.3:2008

Number: 040/10

This Certificate of Conformance to the Product Certificate Scheme for "Domestic Wastewater Treatment Units (Septic Tanks) and Rainwater Tanks" remains the property of Global Certification Pty. Ltd. and is granted subject to the terms and conditions of the Contract Application, in respect of the Product certified on this page and the attached schedule to the Certification of Conformance, bearing the same number as this certificate.

Company: **TAYLEX INDUSTRIES PTY LTD**

Head Office Address: **56 PRAIRIE ROAD, ORMEAU QLD 4208**

Recertification Date: **10 April 2016**

Expiry Date: **11 July 2021**

Product Certified:

Tank Type	Description	Total Size	Working Capacity	Additional Product Information	Manufacture & Assembly Points
Taylex Poly ABS	Vertical Axis, rotational moulded Polyethylene Secondary Effluent at the 8EP and 10EP Level with Nutrient Reduction at 53.71% for Nitrogen and Phosphorus removal using Chlorine disinfection.	7,078 Lt	10 EP 6,036 Lt 8EP 5024 Lt	Average test Results achieved: *BOD_5 1.0 g/m^3* *TSS 6.44 g/m^3* *Total Nitrogen 24.9mg/L* *Total phosphorus 2.5mg/L* *E.Coli and faecal coliform ND in any sample at the dilutions tested* *Turbidity 6.25 NTU* *Dissolved Oxygen 5.6 mg/L* *Average Aeration Chamber Temperature 21.05°C* *Free Chlorine 1.10mg/L*	Manufactured and assembled at: 56 Prairie Road Ormeau QLD 4208

1 June 2012

Certification Date

Bruce Smith Director

Signed for and on behalf of Global Certification Pty Ltd

PO Box 195, Morayfield QLD 4506

DATE OF ISSUE: 11 July 2016

www.jas-anz.com.au/register

© Global Certification Pty. Ltd. GC0050B R1 May 2013

Why install a MAXI Tank All Purpose Advanced Septic Tank

Extend the life of septic trenches and absorption beds.

Better Effluent
A Taylex MAXI Tank produces better quality effluent than a standard septic tank. By acting like a large grease trap, and utilising the 5 chambered tank to slow F.O.G.(fats, oils and greases) down for digestion by bacteria. The discharged effluent is much clearer and free of solids and grease that will clog up and break down your trenches over time. Remember when you had to install a grease trap, back then trenches lasted longer than they do today.

Taylex Filter
The system is fitted as standard with a Taylex TFS Outlet Filter which adds to the protection by arresting any solids that may still be present at the time of effluent discharge to the trenches.

One Piece Tank
Whether concrete or plastic, the Taylex™ MAXI Tank has been constructed with 5 internal chambers that have a no underwater joins to leak or fail. Baffles (compartment walls) carry the same 15 year warranty that the tank body has.

Full Wall Construction
Both the concrete and plastic tank has been manufactured with internal walls that extend to the lid of the tank. This creates a larger than average buffer area to accommodate shock loads of waste that would normally cause flooding and contamination in a system. The lid of the tank contacts the top of the chamber walls to prevent solids transfer within the tank.

Quality Purpose Designed Components
At Taylex™ we believe that using the best quality materials is vital to the long term success of any wastewater treatment system. We only use materials that will withstand the harsh environment that they will be used in.

Fewer Pump-Outs Required
All septic tanks and treatment plants will require a pump out at some stage to remove the undigested solids in the tank. Standard septic tanks may require a pump out more often as they have only one or two chambers and do not allow the bacteria to digest solids efficiently in the overloaded effluent. As in Treatment Plants the Taylex Maxi has 5 chambers – the effluent in each one is a little cleaner and clearer than the previous chamber. This allows the bacteria to work more efficiently as the effluent makes its way to the disposal chamber.

GRAVITY or PUMP?
The Taylex Maxi Tank is made with gravity overflow outlet as standard, however it is easily fitted with an irrigation pump and high water alarm should you require your disposal to be uphill from the tank.

PLASTIC or CONCRETE?
Please ask your Taylex Distributor to do a site inspection or use his knowledge of your area to ascertain which tank material will be the most cost effective for a Taylex MAXI Tank install on your block. He will take into account access on your site for a truck and/or a crane against the cost of a plastic vessel or a concrete vessel. He will also monitor the invert depth required to accommodate the 1:60 fall of the drain-line from your house to the tank. Both vessels are cast in one piece and are exceptionally strong – please see The Taylex Difference section in this brochure.

Self Anchoring Tank
The Plastic tank is built with anti-floatation protrusions incorporated into the design. There is no need for chains or concrete to hold the tank in the ground.

The Concrete tank is built with a weight of 6ton and will hold itself in the ground while a routine pump out is conducted.

Lower Invert – Connection pipe
The concrete tank has a lower Invert – 100mm opening where the drain-line from your house connects into the tank . This allows for a gravity feed that can accommodate the long drain-lines (that must fall 1:60) found in many modern house plans where wet areas of the home are spread between several areas of the house.

The standard concrete tank comes with inverts at 470mm & 770mm from the top of the tank. Taller tanks are available with inverts at 1070mm and 1170mm from the top of the tank. This eliminates the need to use a septic tank at both ends of the house. The plastic tank also has a deeper invert although it is a little shallower than the concrete tank. Ask your Taylex Distributor for his advice.

Effluent Disposal Fields - (Trenches etc.)
Your local council will stipulate the type of effluent management allowable in your area. Ask your Taylex Distributor to organise an essential Wastewater Disposal Report to be submitted to council.

Taylex 4000Lt
Baffle Walled Septic Tank

A Primary Effluent System

Tank Construction – All Concrete Vessel

Height	2175mm
Tank Diameter	1935mm
Inlet Invert (from Base)	1700mm
Outlet (from Base)	1640mm
Maximum Dry Weight	3.4 tonnes

The Taylex 4000Lt B/W Septic Tank is a standard septic tank with a baffle wall that can be sealed or unsealed or removed as required.
Also available with pump, high level post alarm light and float switch.

5 Chambered Septic Tank

Septic System

Taylex Maxi
All Purpose Septic Tank

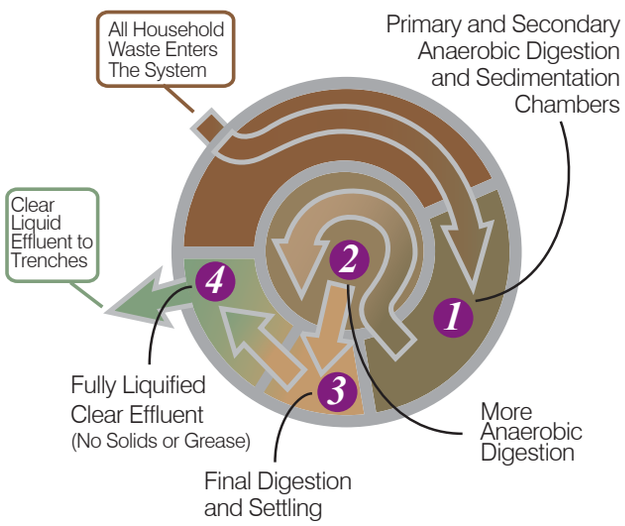
Advanced Primary Effluent System

Makes septic trenches last longer!

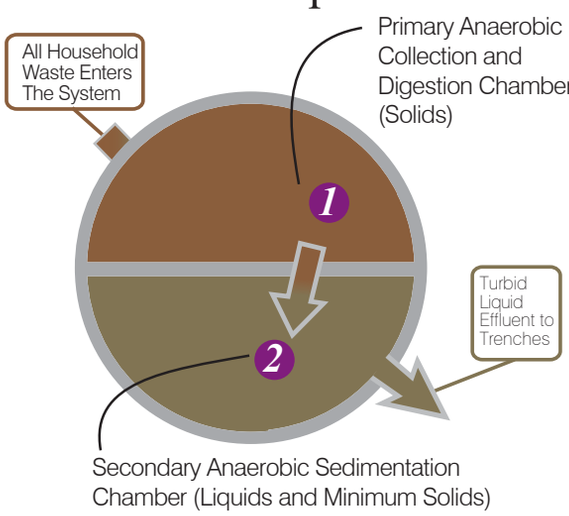
The Taylex MAXI Tank is the largest commercially manufactured domestic advanced primary (septic) tank on the market in Australia today.

It has a unique 5 chambered construction in one piece of concrete or plastic with walls (baffles) extending to the lid of the tank. This septic tank is suitable for all homes up to 6 bedrooms.

Taylex ★★ MAXI
All Purpose Septic



Compared to...
Standard Septic ★


All Household Waste Enters The System
Primary Anaerobic Collection and Digestion Chamber (Solids)
1
2
Turbid Liquid Effluent to Trenches
Secondary Anaerobic Sedimentation Chamber (Liquids and Minimum Solids)

Available in Concrete or Plastic

Greasetrap and Septic All in One Tank

Effluent Grade | **Advanced Primary/Septic**

Tank Construction – All CONCRETE Vessel

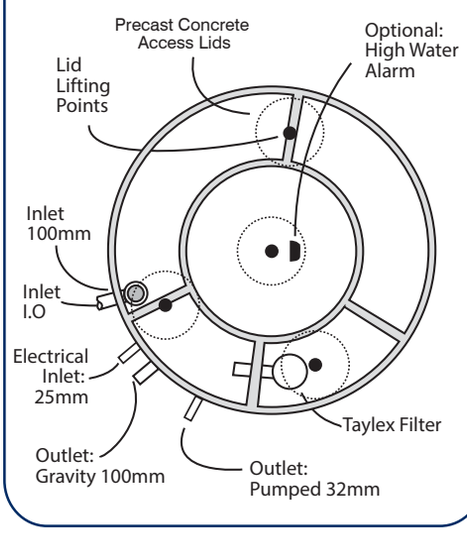
Height	2300mm
Inlet Invert (from Base)	1530mm & 1830mm
Tank Diameter	2440mm
Operating Capacity	6300Lt
Maximum Dry Weight	6.1 Tonnes

A Concrete "Tall" tank is also available

Tank Construction – All PLASTIC Vessel

Height	2500mm
Inlet Invert (from Base)	1770mm
Tank Footprint	2400mm x 2530mm
Operating Capacity	6066Lt
Maximum Dry Weight	450kg Allow 600kg as all tanks are water tested

MAXI Tank - Top View



Concrete & Plastic Tanks
15 Year Tank Warranty Includes Internal Compartment Walls... Plus 3 Years Electrical Components Warranty

For Larger Homes (Qld)

Sewage Treatment Plant

Taylex Deluxe (Secondary)

15 Persons - For Large Homes

Qld Only

Step 1: All waste from the home enters the primary pre-treatment chamber of the Taylex System with liquid then flowing into the secondary chamber. The time that waste spends in both these anaerobic* chambers allows bacterial action to condition it before it flows into the aeration chamber.

Step 2: The aeration chamber is designed to retain & mix the liquid while aerobic** bacteria digest the organic material. The aerator introduces oxygen by drawing fresh air through the vent and injecting it into the chamber while circulating the entire contents. The aerobic** bacteria multiply rapidly in this oxygen enriched environment and are thoroughly mixed with the pre-treated liquid to ensure complete oxidation of all organic material.

Step 3: The liquid then flows into the clarification chamber for settlement where the remaining organics are further digested by bacteria living on specially designed bio-mass sheets.

Step 4: Pre-treated, aerated and settled, the liquid then passes through a Taylex filter prior to chlorination. The filtered liquid passes through a chlorinator which ensures the disinfection of the reclaimed effluent.

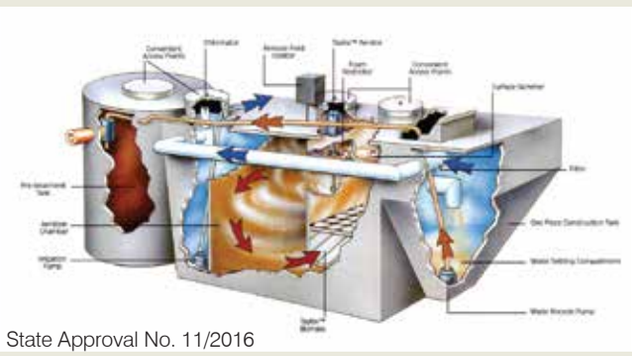
Then your reclaimed effluent is returned to the environment via spray or underground irrigation by a silent pump.

1st Tank Construction – All Concrete (round)

Height	2140mm
Inlet Invert (from Base)	1700mm
Tank Diameter	1930mm
Maximum Dry Weight	4 tonnes

2nd Tank Construction – All Concrete (oblong)

Height	1800mm
Inlet Invert (from Base)	1400mm
Length x Width	3200mm x 1700mm
Maximum Dry Weight	5.2 tonnes



State Approval No. 11/2016

Taylex ABS & Maxi Systems

- One Tank
- One Connection
- One Hole

Applications

NEW HOMES – it's all so simple:
• One Tank • One Hole • One Piece Construction
Which means easier installation by having lower costs for plumbing and excavation – and the system is discreetly hidden in your garden. This, combined with a holding capacity 30% larger than other units means a TAYLEX™ System is the most efficient, cost effective and easily maintained sewage solution available.

EXISTING HOMES – it's a simple process to replace your existing septic system with a strong, safe and reliable TAYLEX™ System. No more grease traps, odours or soggy back yards.

Getting Started

1 Ask our Taylex Consultant to organise a Wastewater Disposal Report (Site & Soil Test for placement of a Effluent Disposal – Spray or subsurface irrigation , trenches etc.). Then you will be aware of what system your Local Council will allow to be placed on your property and we can quote for you.

2 We can then do Site Inspection (if required) to ensure your install will run smoothly. Please be aware that in some cases it is best to install your tank prior to building your home to make sure that access is available.

PLEASE NOTE: Make sure you inform your Taylex Consultant, builder or plumber of any future sheds, pools, driveways or dams. The positioning of these items may impact on the placement of your irrigation area and impeded commissioning of your System prior to you moving in to your new home. Gazetted setback distances need to be adhered to so council final approvals can be obtained.

* Anaerobic - Meaning: without air (Oxygen), The bacteria in an anaerobic environment do not require oxygen to survive and flourish.

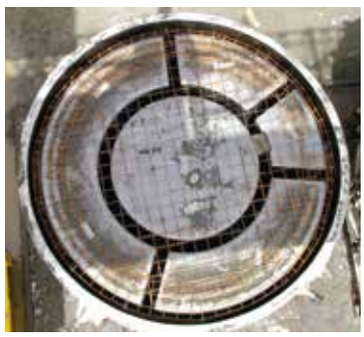
** Aerobic - Meaning: with air (Oxygen). The bacteria an aerobic environment do require air to survive. The system introduces extra oxygen into an aerobic chamber to allow these "good" bacteria to multiply and flourish.

The #1 Taylex Difference…

Our Purpose Built Tanks

- Poured or Moulded in One Piece
- No Joins or “Glued in” Compartments
- All Partitions extend to the Lid of the Tank
- NO INTERNAL LEAKAGE

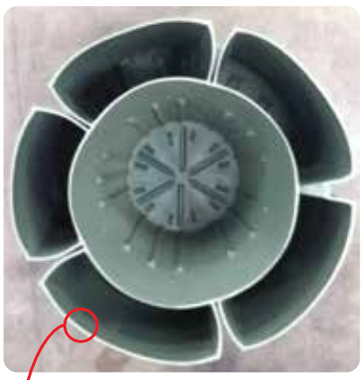
Concrete Tanks



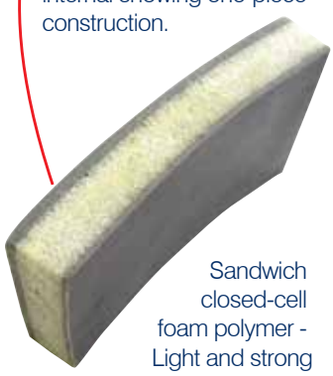
Inverted Mould with Reinforcing Ready for Concrete

Completed Tank Ready for Fitout and Lid

Plastic Tanks



Sectional view of plastic tank internal showing one-piece construction.



Sandwich closed-cell foam polymer - Light and strong

15 Year Tank Warranty Includes Internal Compartment Walls… Plus 3 Years Electrical Components Warranty*

*ABS and MAXI Systems Only

The Treatment Process - *A living thing*

Most Wastewater/ Sewage Treatments are a biological process for domestic, commercial and municipal applications.

A Treatment Plant is a living organism. There are trillions of living bacteria that make the system work properly - even in large city sewage treatment plants! Your Local and City Councils will have laws in place that prevent the dumping of certain chemicals through their drains. Large amounts of chemical will “kill” off their living system and create havoc in their treatment plants... and often does. A city plant is a large scale operation and they will have the excess treatment power to overcome most daily problems.

Your Home Sewage Treatment Plant is a miniature version of the City Plant. Because it is smaller and only designed to treat the amount of waste you produce from your home it will be more noticeable to you if you accidently “kill” off your living system’s bacteria. The bacteria are produced from our bodies and should a “Kill” ever occur within the system it will rebuild the ecosystem again from normal usage once the “Kill Factor” has been removed.

When using your Taylex system we ask that you respect the system and be mindful of the need to provide a safe and happy home for your colony of bacteria to live and work in. Should the balance be upset by mistake (e.g . a bleach product is used etc.) we will help to ascertain the cause and find the remedy. We suggest you read the tips in your Home Owner’s Manual to avoid or minimise the use of cleaners etc. that may upset the system. This is not normally an arduous chore but a simple rearrangement of your cleaning products preferences.

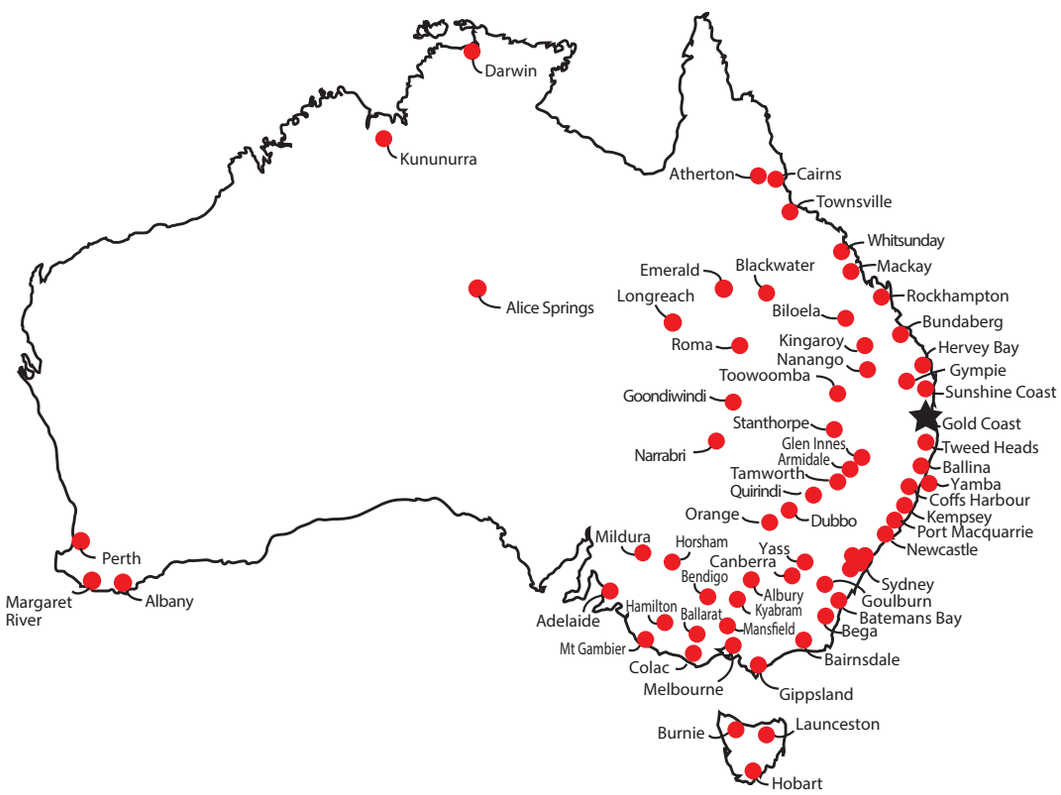
Taylex Systems are either:
Septic – Anaerobic bacteria
Aerated – Anaerobic and Aerobic bacteria

Our Committment - Service, Reliability & Quality

Professional after sales service together with emergency breakdown response is provided by our qualified service technicians using our modern fleet of service vehicles. Our service technicians are qualified and licensed by the relevant state government authorities ie. Plumbers and Drainers Licensing Board and Wastewater Service Persons Course to ensure that they offer the highest quality in service.

Superior treatment systems with reliable performance...
Working for you and the environment.
Protecting your family and the environment.

Call Your Local Authorised Distributor



Reclaim Re Use Recycle

AWTA MEMBER
AUSTRALIAN WASTEWATER TREATMENT ASSOCIATION

Taylex Tanks
Since 1969
Wastewater & Rainwater Specialists

1300 TAYLEX
www.taylex.com.au

CONTACT YOUR LOCAL DISTRIBUTOR

JAS-ANZ
AS/NZS ISO 9001:2008

The Standards Mark refers to the vessels & systems manufactured by Taylex.

It does not cover the other items of equipment contained in the system.

10-2016

Can we also help with your rainwater tank requirements?

APPENDIX D – LCC LAND APPLICATION AREA SIZING MODEL

Lismore CC On-site Wastewater Model (Single Rural Households) OSmodel300614.xls
Printed 18-3-2019

		Default	User-defined
Client	NCV Enterprises Pty Ltd		
Address	Mount Burrell		
Site	Block size (m2)		2000
	Buffer (m) from land application area to stream	>100	
	Water (L/p.d) from Reticulated + full water saving devices	150	120
	Persons		4
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components per system	Toilet ☑		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	480	
Treatment system	Secondary: AWTS		
	Nitrogen removal %	20%	
Land application	Land application type: ETA beds	Slope%	
	Depth of soil above gravel layer (= root zone) (mm)	150	
	Depth of gravel layer (mm)	250	
Soil information	Morand code: Red Basaltic Soils = bg, co, el, ew, mb, ro, wo		
	Phosphorus sorption (kg/ha.m)	10000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure: Med. to heavy clays - mod. Structured		
	Maximum deep drainage rate (mm/d)	4	
Area calculations	Hydraulic area (m2)	161.9	
	Nitr. area (m2) [N perc.granted/plant.avail:6.77 / 10.75kg/yr]	199.2	
	Phos. area (m2)	40.0	
	Required land application area (m2)	**199.2**	

lismore city council

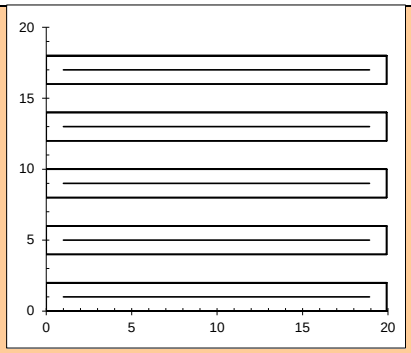
Land application sizing tool for on-site wastewater management systems

Where user-defined values are required in place of default values, these may be entered in the light coloured boxes to the right of the default values.

For some parameters there are no default values offered, and the user must enter values in the appropriate light coloured boxes.

Whilst the spreadsheet detects some obvious input errors, it is the user's responsibility to provide meaningful combinations of parameters suitable to the application design.

Rectangular Trench Layout



		Default	User defined
	Land Application Area (LAA) (m2)	199.2	
	Number of trenches	5	
	> 3 trenches: special design features needed		
	Trench width (m)	2.0	2.0
	Trench separation (m)	2.0	2.0
List of dimensions	Trench length (m)	19.9	
	Trench width (m)	2.0	
	Number of trenches	5	
	Trench separation (m)	2.0	
	Trench area / LAA (m2)	199.2	
	LAA including trench separation: length (m)	as for trench length	
	LAA including trench separation: width (m)	18.0	
	LAA including trench separation: area (m2)	358.6	

lismore city council

ETA trench layout design tool

Where user-defined values are required in place of default values, these may be entered in the light coloured boxes to the right of the default values.

The spinner button is used to increase or decrease the number of trenches.

The 'Resize chart axes' button may be pressed if an action upsets the match between trench layout and chart axes.

Lismore CC On-site Wastewater Model (Single Rural Households) OSmodel300614.xls
Printed 18-3-2019

		Default	User-defined
Client	NCV Enterprises Pty Ltd		
Address	Mount Burrell		
Site	Block size (m2)		2000
	Buffer (m) from land application area to stream	>100	
	Water (L/p.d) from Reticulated + full water saving devices	150	120
	Persons		4
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components per system	Toilet ☑		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	480	
Treatment system	Secondary: AWTS		
	Nitrogen removal %	20%	
Land application	Land application type: Subsurface drip irrigation	Slope%	
	Design depth of root zone (mm)	300	
Soil information	Morand code: Red Basaltic Soils = bg, co, el, ew, mb, ro, wo		
	Phosphorus sorption (kg/ha.m)	10000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure: Med. to heavy clays - mod. Structured		
	Maximum deep drainage rate (mm/d)	2	
Area calculations	Hydraulic area (m2)	505.7	
	Nitr. area (m2) [N perc.granted/plant.avail:6.77 / 10.75kg/yr]	199.2	
	Phos. area (m2)	40.0	
	Required land application area (m2)	**505.7**	

lismore city council

Land application sizing tool for on-site wastewater management systems

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Lismore CC On-site Wastewater Model (Single Rural Households) OSmodel300614.xls
Printed 18-3-2019

		Default	User-defined
Client	NCV Enterprises Pty Ltd		
Address	Mount Burrell		
Site	Block size (m2)		2000
	Buffer (m) from land application area to stream	>100	
	Water (L/p.d) from Reticulated + full water saving devices	150	90
	Persons		4
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components per system	Toilet ☑		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	360	
Treatment system	Secondary: AWTS		
	Nitrogen removal %	20%	
Land application	Land application type: ETA beds	Slope%	
	Depth of soil above gravel layer (= root zone) (mm)	150	
	Depth of gravel layer (mm)	250	
Soil information	Morand code: Red Basaltic Soils = bg, co, el, ew, mb, ro, wo		
	Phosphorus sorption (kg/ha.m)	10000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure: Med. to heavy clays - mod. Structured		
	Maximum deep drainage rate (mm/d)	4	
Area calculations	Hydraulic area (m2)	121.4	
	Nitr. area (m2) [N perc.granted/plant.avail:6.77 / 10.75kg/yr]	199.2	
	Phos. area (m2)	40.0	
	Required land application area (m2)	**199.2**	

lismore city council

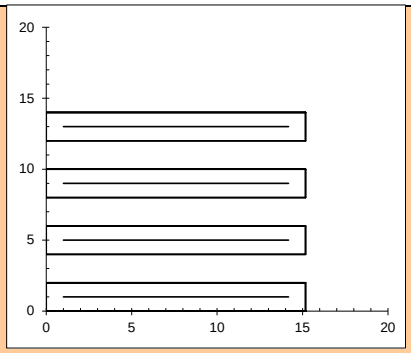
Land application sizing tool for on-site wastewater management systems

Where user-defined values are required in place of default values, these may be entered in the light coloured boxes to the right of the default values.

For some parameters there are no default values offered, and the user must enter values in the appropriate light coloured boxes.

Whilst the spreadsheet detects some obvious input errors, it is the user's responsibility to provide meaningful combinations of parameters suitable to the application design.

Rectangular Trench Layout



		Default	User defined
	Land Application Area (LAA) (m2)	199.2	121.4
	Number of trenches	4	
	> 3 trenches: special design features needed		
	Trench width (m)	2.0	2.0
	Trench separation (m)	2.0	2.0

List of dimensions	Trench length (m)	15.2
	Trench width (m)	2.0
	Number of trenches	4
	Trench separation (m)	2.0
	Trench area / LAA (m2)	121.4
	LAA including trench separation: length (m)	as for trench length
	LAA including trench separation: width (m)	14.0
	LAA including trench separation: area (m2)	212.5

lismore city council

ETA trench layout design tool

Where user-defined values are required in place of default values, these may be entered in the light coloured boxes to the right of the default values.

The spinner button is used to increase or decrease the number of trenches.

The 'Resize chart axes' button may be pressed if an action upsets the match between trench layout and chart axes.

Lismore CC On-site Wastewater Model (Single Rural Households) OSmodel300614.xls
Printed 18-3-2019

		Default	User-defined
Client	NCV Enterprises Pty Ltd		
Address	Mount Burrell		
Site	Block size (m2)		2000
	Buffer (m) from land application area to stream	>100	
	Water (L/p.d) from Reticulated + full water saving devices	150	90
	Persons		4
	☐ Internal wastewater sources split? ☐ Multiple households? How many?		
Wastewater components per system	Toilet ☑		
	Bathroom ☑		
	Laundry ☑		
	Kitchen ☑		
	Total wastewater flow (L/d) [needs caution if user-defined]	360	
Treatment system	Secondary: AWTS		
	Nitrogen removal %	20%	
Land application	Land application type: Subsurface drip irrigation	Slope%	
	Design depth of root zone (mm)	300	
Soil information	Morand code: Red Basaltic Soils = bg, co, el, ew, mb, ro, wo		
	Phosphorus sorption (kg/ha.m)	10000	
	Depth to water table or bedrock (for P calcs) (m)		3
	Texture/structure: Med. to heavy clays - mod. Structured		
	Maximum deep drainage rate (mm/d)	2	
Area calculations	Hydraulic area (m2)	379.2	
	Nitr. area (m2) [N perc.granted/plant.avail:6.77 / 10.75kg/yr]	199.2	
	Phos. area (m2)	40.0	
	Required land application area (m2)	**379.2**	

lismore city council

Land application sizing tool for on-site wastewater management systems

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APPENDIX E – EXAMPLE COMPOSTING TOILETS

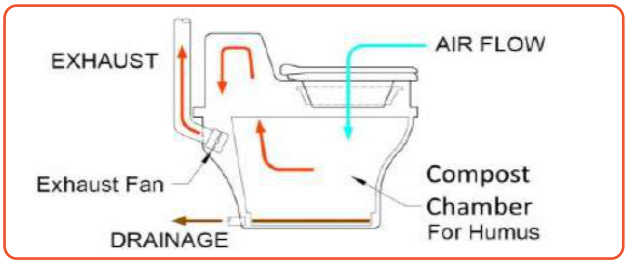
ecoLet
WATERLESS COMPOSTING TOILETS

EcoLet™ Range
Waterless Composting Toilet

EcoLet™ Composting Toilet

All Ecolet™ have a compost cover that opens automatically when the seat is pressed down. When you chooes an EcoLet™ you will use no chemicals or water, you will not need a septic tank, and best of all, there is no odour!

All EcoLet™ models are certified to Australian & New Zealand Standard 1546.



Additional wall-kit, replacement fans & solar package available.

How does the EcoLet™ work?

The Ecolet™ uses modern technology to accelerate and optimise natural biological decomposition, evaporate excess liquid and to exhaust odours and water vapour, all within an attractive home appliance that is easy to use and economical to operate.

The 15e and 25e have heaters and fans relevant to their particular size.

The 15e requires a couple of turns of the T-handle, which is located at the top after each use to mix and aerate the compost.

The 25e has a fully automatic mixing system mechanism. Simply lower the seat after each use and the unit does the rest. There is no risk that mixing is forgotten by children or guests.

Select a model by Capacity

EcoLet™ *NE Slimline*

Batch Composter
2 people full time
4 people part time*

Electrical Rating
Non Electric
(12 volt fan)

Dimensions
Height 635mm
Width 400mm
Depth 740mm

Materials
- Outer casing of ABS plastic.
- Metal components of stainless steel.

EcoLet™ *NE Separera 30*

Urine separator Batch composter
2 people full time
4 people part time*

Electrical Rating
Non Electric
(12 volt fan)

Dimensions
Height 635mm
Width 400mm
Depth 740mm

Materials
- Outer casing of ABS plastic.
- Metal components of stainless steel.

EcoLet™ *15e*

Semi Automatic
2 people full time
3 people part time

Electrical Rating
240 Volt
250 Watt max
heater 225 Watt
fan motor 25 watt

Dimensions
Height 650mm
Width 550mm
Depth 710mm

Materials
- Outer casing of ABS plastic.
- Mixing device and other important metal components of stainless steel

EcoLet™ *25e*

Fully Automatic
3 people full time
4 people part time

Electrical Rating
240 Volt
320 Watt max
heater 250 Watt
mixer motor 45 Watt
fan motor 25 wattt

Dimensions
Height 650mm
Width 550mm
Depth 710mm

Materials
- Outer casing of ABS plastic.
- Mixing device and other important metal components of stainless steel

Get in Touch

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